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THE EDUCATION OF TRANSPORTATION PLANNING PROFESSIONALS

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Research Report SWUTC/02/167222-1

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ABSTRACT

The practice of transportation planning at the regional level has evolved substantially over the past several decades. Once defined as largely a technical exercise, in which the calculation of required roadway capacity was the pre-eminent activity, transportation planning now encompasses a wide range of sometimes conflicting problems and demands, from growing levels of congestion and worsening air quality to neighborhood preservation and social equity concerns. But are the curricula in the planning and engineering programs that educate and train transportation professionals adequately preparing them for these new challenges? The objective of the study summarized in this paper was to compare the kinds of knowledge and skills important to transportation professionals today to the kinds of knowledge and skills that planning and engineering programs provide their students in order to highlight areas for improvement and suggest ways to enhance the education of transportation professionals. The research involved several components: a literature review on transportation education and planning education, an analysis of ISTEA and TEA-21 planning requirements, construction and analysis of a database on planning programs and selected transportation engineering programs as to their course offerings in the area of transportation planning, a survey of transportation planning professionals, and interviews with selected transportation planning educators and professionals. This report presents the findings from those efforts and suggests several important issues for transportation educators to address to improve the quality of education for transportation planning professionals.

EXECUTIVE SUMMARY

The practice of transportation planning at the regional level has evolved substantially over the past several decades. Once defined as largely a technical exercise, in which the calculation of required roadway capacity was the pre-eminent activity, transportation planning now encompasses a wide range of sometimes conflicting problems and demands, from growing levels of congestion and worsening air quality to neighborhood preservation and social equity concerns. Federal transportation policy, as now shaped by the Transportation Efficiency Act of the 21st Century (TEA-21), dictates both the factors that regional officials must consider and the kinds of processes they must use in developing transportation plans. As a result, transportation professionals now more than ever need an extensive base of knowledge and a broad set of skills - technical skills but also communication skills, for example - to effectively perform their jobs.

But are the curricula in the planning and engineering programs that educate and train transportation professionals adequately preparing them for these new challenges? Planning programs, for example, may introduce students to transportation modeling techniques but do not often provide the opportunity for meaningful hands-on experience in developing and applying such models. Engineering programs, on the other hand, may provide sufficient technical training but little exposure to public involvement theory and techniques. With limited course hours in which to cover the broad field of transportation planning, programs must pick and choose what material will be required for all students, what material will be covered in elective courses, and what material will be left to an internships and on-the-job training. The resulting curricula may leave important gaps for those planning and engineering graduates who pursue careers in or related to regional transportation planning. These gaps in training potentially reduce the effectiveness and efficiency of transportation planning practice and may ultimately impact our communities in negative ways.

The objective of this study was to compare the kinds of knowledge and skills important to regional transportation planners today to the kinds of knowledge and skills that planning and engineering programs provide their students in order to highlight areas for improvement and suggest ways to enhance the education of transportation planners. The study addressed three general questions:

1. What skills and knowledge do today's transportation planners need?
2. What skills and knowledge are planning and engineering programs providing?
3. How well do these match?

The research involved several components: an analysis of TEA-21 planning requirements, a literature review on transportation education and planning education, construction and analysis of a database on planning programs and selected transportation engineering programs as to their course offerings in the area of transportation planning, a survey of transportation planning professionals, and interviews with selected transportation planning educators and professionals. Chapter 2 summarizes the literature review. Chapters 3 and 4 look at the professional perspective, through the on-line survey and interviews, respectively. Chapter 5 and 6 turn to the academic perspective, presenting the curriculum review and interviews with academics, respectively. Chapter 7 examines the outlook of today's transportation planners based on an attitudinal component of the on-line survey. The report concludes in Chapter 8 with an overall analysis of the findings and presents recommendations for the improvement of transportation planning education.

SURVEY ANALYSIS

The survey results suggest that most planning and engineering programs are covering most of the knowledge and skills that transportation planners need at about an adequate level. While that finding could be interpreted as good news for the profession, it also suggests substantial room for improvement. Perhaps the most striking result is the importance of public involvement and communication skills for the respondents and for entry-level planners coupled with the high share of respondents, especially those with masters degrees in engineering, that say that these skills were not covered in their degree programs. On the other hand, respondents with planning degrees are often missing out on the development of technical skills. The survey results also point to a lag between the skills and knowledge needed by transportation planners today and those they acquired in their degree programs many years earlier. Topics of new importance to the field of transportation planning, including environmental justice, Americans with Disabilities Act, air quality conformity, bicycle and pedestrian planning, environmental and sustainability issues often emerged as high priorities for additional attention in transportation programs.

INTERVIEWS WITH PROFESSIONALS

Changes in the practice of transportation planning that have come about since the passage of ISTEA in 1991 have contributed to a change in the kinds of skills and knowledge that MPOs and other agencies look for when hiring for entry-level positions. First, many of the skills that are important for today's transportation planners are not skills that are traditionally imparted through the classroom, particularly skills related to working with people. As a result, agencies place a great value on experience when evaluating applicants for entry-level positions. Second, today's transportation planners require a broad set of skills and knowledge in many different areas. As a result, agencies have come to value a planning degree on par with (or higher than) an engineering degree, and often hire applicants from backgrounds other than planning or engineering, especially if they have experience.

These findings have important implications for academic programs. First, both planning and engineering programs need to explore ways of incorporating training in all important skill and knowledge areas into their curricula. However, some areas are easier and more appropriate for these programs to incorporate than others. Imparting an understanding of the planning process and of transportation planning institutions is an important and achievable goal for these programs, for example. Developing an ability to work well with others is also an important goal, but one that is harder for academic programs to achieve. Second, to ensure that students develop these more subtle skills, planning and engineering programs need to explore ways of giving students opportunities to gain meaningful professional experience. Real-world, team-oriented course assignments and well-managed internships are an obvious approach.

CURRICULUM ANALYSIS

What the research in this chapter most clearly shows is that there is no standard or uniform approach to transportation planning education, within either planning schools or non-planning transportation programs. The number of transportation planning courses offered and the content of such courses are highly variable. Non-planning programs (the majority of which are engineering programs) offer 3.8 transportation planning courses on average, while planning programs offer 2.6 on average, but some programs offer two or three times as many transportation planning courses. Several of the leading transportation education programs offer potential models of interdisciplinary curricula, but none has yet established a standard for the

field. A more detailed analysis of the content of transportation planning courses guided by the survey results described below, to be completed in the subsequent phase of this study, should offer more insights into the range of topics covered and the depth of coverage of each topic in these programs.

INTERVIEWS WITH EDUCATORS

Although the general consensus is that both planning and engineering programs are successfully providing a wide range of skills and knowledge to their students, most educators stress the need for more attention to both communication and analytical skills and to the achievement of an effective blend of planning and engineering skills. Establishing interdisciplinary programs to provide transportation students with the skills and knowledge they need to be effective professionals is not easy. Although both planning and engineering educators recognize the importance of such efforts, they have run into significant obstacles in their own attempts to improve transportation education. Some of these obstacles are administrative (e.g. delays in filling an open position, insufficient resources to help students find employment), while others are systemic to academia (e.g. lack of recognition for multidisciplinary work). In addition, the pace of change in the profession of transportation planning points to a need for regular reassessments of the curricula in planning and engineering programs, as well as efforts to provide students with professional experience as a part of their education.

CONCLUSIONS AND RECOMMENDATIONS

The literature review, the survey of professionals, the curriculum analysis, and interviews with selected professionals and educators together point to several important and interrelated issues that transportation educators must resolve. The following comments are a synthesis of critiques and recommendations from all of these sources.

Communication Skills

The importance of communication skills is emphasized by just about everyone, researchers, professionals, and educators alike. This set of skills includes writing, data presentation, public speaking, and interpersonal relations. The challenge for transportation educators is to find effective ways of improving the communication skills of their students.

Giving students practice in writing reports for the public or making presentations at public meetings is a start, but students also need more formal training to fully develop these skills.

Educator-Professional Link

The lag between the changing transportation planning context and the content of transportation planning curricula suggests a need for strong and respectful links between the professionals and educators. Many such links currently exist: professional planners serve on the accreditation teams for planning programs, educators work with professionals on consulting projects, and so on. Yet formal mechanisms for feedback from professionals to educators on the content of their curricula may be too rare.

Theory-Practice Tension

A related issue is an age-old tension between the teaching of theory and the teaching of practice. Professionals often fail to see the importance of the theory they learned as students. Students are often anxious to acquire the skills that they believe will help them land a good job. Educators often find it difficult to teach theory in ways that convince the students of its importance and incite their interest in the material. Yet theory helps transportation planners understand the phenomena they work with and the inherent subjectivity of the work they do, and it helps prepare them for taking on new challenges as the field of transportation planning evolves. Theory thus provides them with another important tool for doing good work.

Critical Thinking

Teaching transportation planning students to think critically is another important challenge for transportation educators. Transportation planners must understand both the strengths and limitations of the tools and techniques they use. They must be able to identify the different perspectives from which a problem can be defined or a solution evaluated. They must be able to acknowledge how their own attitudes and experiences influence the work that they do. They must be trained to question their work and the work of others in constructive ways. To meet this challenge, educators must think critically about their own work, in particular, the style of their teaching.

Political Context

An ability to work in an increasingly politicized climate is another requirement for today's transportation planner. Good communication skills, shared insights from experienced planners, a knowledge of planning theory, and critical thinking skills all contribute to this ability. Giving students a taste of the political realities of transportation planning and the kinds of compromises necessary for completing projects is another important challenge for transportation educators and demands creativity in the design of courses and class exercises.

Multi-Disciplinary Connections

Just about everyone also argues for the importance of multi-disciplinary connections to meet these challenges. Many programs appear to have made at least some of these connections, if only motivated by necessity rather than pedagogy, although these connections often depend on personal contacts and individual commitment. A few programs appear to have made these connections in a meaningful way, ensuring an education balanced between traditional technical skills and the "softer" kinds of skills demanded of today's transportation planners. The experiences of these programs may provide important guidance for the others on how to create an effective multi-disciplinary transportation planning program.

These findings point to a need for changes in planning and engineering programs to better prepare graduates for careers in or related to transportation planning. Curricular changes must include not just the topics and skills covered but also the ways in which students are trained and educated inside and outside the classroom. Of course, there's a limit to what academic programs can provide to their students, and on-the-job experience will always be an important source of training and education as well. But planning and engineering programs can almost certainly do a better job of preparing their graduates for the messy and evolving reality of transportation planning. Curricular improvements can help to improve the effectiveness and efficiency of transportation planning practice, impacting our communities in positive ways. Curricular improvements can also help to increase the value of a degree in transportation, whether offered by a planning, engineering, or multidisciplinary program, thereby benefiting both the programs and their graduates. To effect these changes, academic programs will need help from the transportation planning profession and from their own institutions and they will need to

overcome their own inertia. The challenges may be daunting, but the potential payoff is promising.

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DISCLAIMER

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CHAPTER 1. INTRODUCTION

The practice of transportation planning at the regional level has evolved substantially over the past several decades. Once defined as largely a technical exercise, in which the calculation of required roadway capacity was the pre-eminent activity, transportation planning now encompasses a wide range of sometimes conflicting problems and demands, from growing levels of congestion and worsening air quality to neighborhood preservation and social equity concerns. Federal transportation policy, as now shaped by the Transportation Efficiency Act of the 21st Century (TEA-21), dictates both the factors that regional officials must consider and the kinds of processes they must use in developing transportation plans. As a result, transportation professionals now more than ever need an extensive base of knowledge and a broad set of skills - technical skills but also communication skills, for example - to effectively perform their jobs.

But are the curricula in the planning and engineering programs that educate and train transportation professionals adequately preparing them for these new challenges? Planning programs, for example, may introduce students to transportation modeling techniques but do not often provide the opportunity for meaningful hands-on experience in developing and applying such models. Engineering programs, on the other hand, may provide sufficient technical training but little exposure to public involvement theory and techniques. With limited course hours in which to cover the broad field of transportation planning, programs must pick and choose what material will be required for all students, what material will be covered in elective courses, and what material will be left to an internships and on-the-job training. The resulting curricula may leave important gaps for those planning and engineering graduates who pursue careers in or related to regional transportation planning. These gaps in training potentially reduce the effectiveness and efficiency of transportation planning practice and may ultimately impact our communities in negative ways.

The objective of this study was to compare the kinds of knowledge and skills important to regional transportation planners today to the kinds of knowledge and skills that planning and engineering programs provide their students in order to highlight areas for improvement and suggest ways to enhance the education of transportation planners. The study addressed three general questions:

1. What skills and knowledge do today's transportation planners need?
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The research involved several components: an analysis of TEA-21 planning requirements, a literature review on transportation education and planning education, construction and analysis of a database on planning programs and selected transportation engineering programs as to their course offerings in the area of transportation planning, a survey of transportation planning professionals, and interviews with selected transportation planning educators and professionals. Chapter 2 summarizes the literature review. Chapters 3 and 4 look at the professional perspective, through the on-line survey and interviews, respectively. Chapter 5 and 6 turn to the academic perspective, presenting the curriculum review and interviews with academics, respectively. Chapter 7 examines the outlook of today's transportation planners based on an attitudinal component of the on-line survey. The report concludes in Chapter 8 with an overall analysis of the findings and presents recommendations for the improvement of transportation planning education.

CHAPTER 2. RESEARCH ON TRANSPORTATION EDUCATION

The question of the match between the knowledge and skills that transportation planners need and the knowledge and skills provided by planning and engineering programs has been addressed in a handful of previous studies. Most of these studies have been instigated by a significant change in the transportation planning field, for example, the passage of the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. The underlying question in these studies is whether and how quickly the curricula of planning and engineering programs are adapting to the changing demands of the field. For example, in the early 1980s, Hoel (1982) identified the completion of the Interstate system and the budget constraints that were to follow as a significant change in the field that would necessitate a new emphasis on planning, management, and policy in transportation education.

More recently, Sussman (1995) drew conclusions about the future needs of transportation professionals from several trends: the transfer of technology from the military to the civilian arena in the post-Cold War age, the increasing complexity of transportation systems, the tie between the transportation system and the national economy, and international competition. Given these trends, he argued that the "New Transportation Professional" must have skills that are both broad, in the sense of understanding the big picture of transportation, and deep, in the sense of being an expert on one part of the continuum. He warned that academia tends to change incrementally so that it might take a long time to transform a program to meet these new demands. He also argued that implementation of his suggested program would require the inclusion of many different kinds of instructors, not necessarily from the transportation field.

A study by Turnbull (1995) explored the match between professional needs and academic programs in more depth. Her work included a review of relevant legislation (ISTEA, the Clean Air Act Amendments of 1990 and the Americans with Disabilities Act), a review of problem statements from professional associations, and interviews with transportation professionals from the private and public sector representing all levels of transportation planning. Through this work she constructed a list of skills and knowledge areas that were then used to evaluate transportation planning curricula in the United States. Turnbull concluded that several new topics should be covered in introductory transportation planning courses, including multimodalism (while still covering the basics of individual modes), relevant legislation, and

emerging technologies. In her conclusions, she also emphasized the need for transportation planners to be comfortable with both the technical and public involvement skills required today.

In 1997, The Transportation Research Board held a conference specifically aimed at evaluating the education and training needs of implementing all aspects of multimodalism (Meyer 1998). At the time, a review of 67 transportation programs across the United States found that 43% of the programs had added courses related to multimodalism in response to ISTEA, 28% had included multimodalism in the curriculum before ISTEA, and the others either made no change or minor curricular changes (Pignataro and Hoel 1998). The general conclusions from this review were that programs need better communication between relevant departments and that support by administrations for interdisciplinary programs needs to be increased.

Studies of planning programs in general, rather than transportation planning programs specifically, have also generated relevant recommendations. Ozawa and Seltzer (1999) studied the connection between the content of planning programs and the needs of the profession that will employ graduates of these programs. First, they analyzed the specific skills being sought by entry-level planners and compared those to graduate planning curricula. Professional planners were then asked to rate the importance of 45 skills that the researchers gleaned from previous studies and university faculty. The skills related to job performance as well as advancement within the organization. They found that the most highly rated skills were those related to communications: working well with colleagues, working with the general public, and understanding the needs of the client. Orlick (1993) found that professional planners see a need for planning students to acquire better communication skills; he argues for an open dialogue between educators and professionals in order to improve the match between the kinds of skills students acquire in planning programs and those that professional planners need.

This theme relates to another that emerges from studies of planning programs: students need skills that will help them deal with a complex, changing, and highly political world. Dalton (1993) called on planners to take a leadership role in order to foster community and balance the needs of people and the environment. To achieve this end, she advocates a synergistic relationship between educators, researchers, and practitioners. Khisty (1988) discusses the need for transportation professionals to have a strong background in planning theory to help them balance potentially conflicting needs and to play a leadership role in the transportation

profession. A background in planning theory would also help transportation planners address equity issues and operate more effectively in an increasingly politicized field. Like others, Van Zuylen (2000) called for multidisciplinary approaches to transportation education and suggested that transportation problems today are so complex that it takes the expertise of more than one discipline to solve them.

The study summarized in this paper builds on these previous studies but makes several new contributions. First, ISTEA was passed more than 10 years ago, enough time for planning and engineering programs to have responded to the new transportation planning context that ISTEA has engendered if they are going to. In conjunction with the previous studies, this study provides a monitoring of sorts of the progress of these programs. Second, this study looks more directly at the match between professional needs and academic programs by asking practicing professions about their own job experiences and their assessment of applicants for entry-level transportation planning positions. That the recommendations that emerge from this study are similar to those from previous studies suggests that these recommendations need to be voiced once again.

CHAPTER 3. SURVEY OF TRANSPORTATION PROFESSIONALS

To explore the opinions of transportation planning professionals on transportation planning education and directly test the match between professional needs and academic programs, an on-line survey was developed and administered to self-identified transportation planning professionals. Based partly on the results of the literature review and review of ISTEA/TEA-21 planning requirements, lists of knowledge and skill areas potentially important to transportation planning professionals were developed (Table 3-1). These lists were used in several key questions in the survey relating to the respondent's own professional and educational experiences and to the respondent's assessment of applicants for entry-level transportation planning jobs. Several questions relating to the demographic characteristics and educational attainment of the respondent were also included in the survey, as was a series of attitudinal questions relating to current issues in transportation planning (summarized in Chapter 7). In order to assess in more detail the match between professional needs and academic programs, all questions were analyzed for the respondents divided by the type of job, the kind of master's degree, and working period after graduation (master's) as well as for the entire respondents. Several open-ended questions also enabled participants to provide unstructured responses. The survey was pretested by eight graduates of the University of Texas, and several modifications to the survey were made based on the results of this pretest. Websurveyor, a professional on-line survey service, hosted the survey. This service automatically tallies the survey responses and provides basic analysis capabilities.

Finding transportation planners to participate in the survey was not a simple task. Graduates of transportation planning programs, for example, do not all work in the field of transportation planning, and not all transportation planners have graduated from transportation planning programs. To achieve a relatively targeted sample of transportation planners, two groups of professionals were invited to participate in the survey: members of the American Planning Association (APA) Transportation Planning Division and members of the Institute of Transportation Engineers (ITE) Planning Council. Using the listserves for these organizations, an e-mail was sent to members from the sponsoring organization with an introduction about the research project and an invitation to participate in the survey. Because not all members of these organizations are practicing transportation planning professionals, the e-mail notice asked

Table 3-1 Topics and Skills

Topics List	Skills List
Air Quality Conformity	Budget Preparation
Americans with Disabilities Act	Cost-Benefit Analysis
Bicycle and Pedestrian Planning	Data Collection
Environmental and Sustainability Issues	Data Presentation
Environmental Justice	Environmental Impact Analysis
Goods Movement	Facility Design
Intelligent Transportation Systems	Geographic Information Systems
Inter-Regional Transportation Planning	Highway Capacity Manual Software
Land-Use Planning	Meeting Facilitation
Law and Regulation	Population Forecasting
Multi-Modal Integration	Public Speaking
Neighborhood Planning	Statistical Analysis
Professional Ethics	Survey Administration
Public Involvement	System Design
Regional Transportation Planning	Technical Writing
Safety	Traffic Impact Analysis
Traffic Calming	Transcad Software
Transit Planning	Travel Demand Modeling
Transportation and Land Use Connection	Working with the Public
Transportation Control Measures	Writing for the Public
Transportation History	-
Transportation System Management	-
Travel Demand Forecasts	-
Travel Demand Management	-
Urban Design	-

recipients who are "working as transportation planners" to participate in the survey. In order to simplify survey participation, no identification codes were used to control the participation in the survey.

This method for administering the survey did not produce an entirely random sample of transportation planning professionals. First, not all transportation planners are members of these organizations. Second, not all members of these organizations have provided e-mail addresses. Third, participation depended on self-identification as a "transportation planner." Fourth, although a precise response rate cannot be calculated, the response rate appears to be relatively low. The notice was sent to 1,041 APA members and to 1,100 ITE members. After four weeks, 360 surveys had been completed, with 23 others deleted for incomplete responses on key questions. Fifty-three percent of respondents said they were contacted through the APA listserve, 31% through the ITE Planning Council listserve, 9% through other means (perhaps from

colleagues), and 7% said they did not know. Despite these limitations, the sample should be sufficient for the exploratory objectives of this study.

3.1 RESPONDENT CHARACTERISTICS

The characteristics of the survey respondents are important background for understanding and interpreting the results of the survey. Of the 360 respondents, 71% had a masters degree as a terminal academic degree, 44% had a master's degree in planning, and 16% a master's degree in transportation civil engineering (Table 3-2). The results presented thus reflect to a large degree

Table 3-2 Education of Respondents

	Frequency	Percent
Terminal Academic Degree		
High School Diploma/Associate's Degree	4	1.1%
Bachelor Degree	82	23.2%
Master Degree	250	70.8%
Ph.D.	17	4.8%
Total (Missing: 7)	353	100.0%
Master 's Degree		
Planning	158	43.9%
Civil-Transportation Engineering	56	15.6%
Joint/Dual Degree	6	1.7%
Others	38	10.6%
Total	258	71.7%
Bachelor's Degree		
Non-Engineering Field	219	67.2%
Engineering Field	99	30.4%
Joint/Dual Degree	8	2.5%
Total	326	100.0%
Master's Degrees for Non-Engineering Majors		
Planning Masters	129	75.4%
Civil-Transportation Engineering Masters	7	4.1%
Other	35	20.5%
Total	171	100.0%
Master's Degrees for Engineering Majors		
Planning Masters	16	23.9%
Civil-Transportation Engineering Masters	45	67.2%
Other	6	9.0%
Total	67	100.0%
Years Since Master's Degree		
1-10	135	52.9%
11-20	61	23.9%
21-30	49	19.2%
30+	10	3.9%
Total (Missing: 12)	255	100.0%

the experiences of graduates of planning programs. Of the 326 respondents having a bachelor's degree, 30% majored in engineering, mostly civil engineering, and 67% majored in other fields, mainly social sciences. Seventy-five percent of the respondents with a non-engineering major pursued a master's in planning, and 67% of the respondents with an engineering major pursued a master's in transportation engineering. While 24% of the respondents with an engineering major pursued a master's in planning, only 4% of the respondents with a non-engineering major pursued a master's in transportation engineering. For respondents with master's degrees, the average time since receiving that degree was 12.4 years but ranged from less than one year to 41 years.

Of the 360 respondents, 43% said that they work for a private consulting firm, 11% at a metropolitan planning organization (MPO), 24% at other regional or local agencies, 9% at state or federal agencies, with the remainder at non-profit or other organizations (Table 3-3). The results presented in the report thus reflect to a large degree the experiences of planners in private consulting firms. Sixty-one percent of respondents were working in organizations with more than 100 employees. Thirty-eight percent of respondents had been certified by the American Institute of Certified Planners (AICP), 21% had Professional Engineers (PE) licenses, and 41% had no professional certification. Membership in professional organizations included the American Planning Association (69% of respondents), the Institute of Transportation Engineers (55%), the Transportation Research Board (23%), and other organizations, including the Woman's Transportation Seminar (WTS), the American Society for Civil Engineers (ASCE), and ITS America. A third of respondents are members of both APA and ITE. Respondents reported that they have worked in the transportation field for an average of 13.7 years, with nearly half working in the field for less than 10 years and 15% working in the field for 26 or more years.

Table 3-3 Professional Experience of Respondents

	Frequency	Percent
Organization		
Private Consulting Firm	153	42.6%
Metropolitan Planning Organization (MPO)	40	11.1%
Other Regional or Local Agencies	86	24.0%
State or Federal Agencies	32	8.9%
Non-Profit or Other Organizations	48	13.4%
Total (Missing: 1)	359	100.0%
Professional Certification		
American Institute of Certified Planners (AICP)	136	37.8%
Professional Engineer (PE)	75	20.8%
None at this time	145	40.3%
Other	53	14.7%
Professional Organization		
American Planning Association (APA)*	248	68.9%
Institute of Transportation Engineers (ITE)*	197	54.7%
Transportation Research Board (TRB)	84	23.3%
Intelligent Transportation Systems America (ITS America)	21	5.8%
Other	114	31.7%
Working Period (Years) in the Transportation Field		
1-10	173	48.1%
11-20	92	25.6%
21-30	77	21.4%
30+	18	5.0%
Total	360	100.0%

* Among 360 respondents in total, 118 respondents (33%) have both APA and ITE membership.

Respondents were evenly distributed between the ages of 25 and 55, with only a small number of respondents younger than 25 and older or than 55 (Table 3-4). The low share of respondents between the ages of 55 and 65 may reflect the movement of transportation planning professionals into more senior positions, a lower rate of participation of older professions in listserves, or both. On other personal characteristics, the sample was not so diverse: over 70% of respondents were male, and 80% of respondents were Caucasian/White. If these statistics are reflective of the entire population of transportation planners, they suggest that the demographics of the field do not even remotely resemble the demographics of the population it serves.

Table 3-4 Personal Characteristics of Respondents

	Frequency	Percent
Age		
18 - 24	4	1.2%
25 - 34	112	32.3%
35 - 44	99	28.5%
45 - 54	106	30.5%
55 - 64	22	6.3%
65+	4	1.2%
Total (Missing: 13)	347	100.0%
Gender		
Female	101	29.5%
Male	241	70.5%
Total (Missing: 18)	342	100.0%
Ethnicity		
Caucasian/White	288	83.0%
African American	12	3.5%
Asian/Pacific Islander	13	3.7%
Rather Not Say	25	7.2%
Other	9	2.6%
Total (Missing: 13)	347	100.0%

3.2 CHALLENGES OF THE JOB

The first question on the survey asked respondents to describe in five words or less "the most challenging aspect" of their jobs. The responses to this question demonstrate the wide range of demands on today's transportation planners, from "effectively working with the public" to "coordination between levels of government" to "dealing with the travel model." Several patterns emerged among the responses, which we sorted into twenty-six different categories (Table 3-5). Technical analysis and public involvement, two of the primary duties of transportation planners, were both among the most frequent categories of responses. The three related categories of time management, managing multiple demands, and project and budget management accounted for 17.6% of responses. But the two most common response categories were politics and building consensus and balancing priorities, and several other categories, adding up to over one quarter of the responses, related to dealing with people: dealing with the public; frustrations with others; persuading, convincing, conveying; landing and dealing with clients; working with different disciplines.

Table 3-5 Most Challenging Aspect of Job

Category	Frequency	Percent
Politics	22	6.8%
Building consensus and balancing priorities	22	6.8%
Technical analysis	21	6.5%
Public involvement	20	6.2%
Time management	20	6.2%
Managing multiple demands	20	6.2%
Dealing with the public	18	5.6%
Frustrations with others	18	5.6%
Persuading, convincing, conveying	18	5.6%
Project and budget management	17	5.2%
Landing and dealing with clients	17	5.2%
Working with different disciplines	14	4.3%
Dealing with change and keeping up	14	4.3%
Making things happen and finding answers	14	4.3%
Coordination with other agencies	13	4.0%
Communicating	13	4.0%
Recruiting and retaining staff	9	2.8%
Limited funding relative to needs	8	2.5%
Integrating transportation and land use	5	1.5%
Technical analysis vs. politics	5	1.5%
Regulations and bureaucracy	4	1.2%
Peronsal motivation	3	0.9%
Regional problems	3	0.9%
Personal skills and knowledge	2	0.6%
Uncertainty	2	0.6%
Development review	2	0.6%
Total (Missing: 36)	324	100.0%

Some of the most interesting responses fell into the rather broad category of frustrations with others. Some respondents expressed frustration with their superiors: "spineless top management," "educating my supervisors," "bosses not care biases inbred," or simply "my boss." Others with decision makers: "politicians!", "incompetent or corrupt public officials." Yet others with co-workers: "bureaucracy and coworkers without a clue," "others' lack of expertise/knowledge." One respondent, a woman, said, "dealing w/men less educated than I." These frustrations are probably not unique to planning but do suggest that a measurable share of planners are rather jaded and disgruntled. The split between respondents who said "dealing with the public" is their biggest challenge and those that said simply "public involvement" also suggests some level of frustration and cynicism in the profession.

Perhaps of most important were several responses in the "working with other disciplines" category. Some of these responses were very general: "working with different disciplines,"

"reconciling different paradigms," "coordinating with other professionals," "coordination information with other professionals." But the rest – 10 responses in all – mentioned working with engineers in particular as their biggest challenge, some in rather strong terms: from "dealing with engineers" and "working with old line engineers," to "communicating with transportation engineers" and "getting engineers to listen," to "engineer's blind adherence to conservative standards" and "trying to get engineers to think!" Another respondent said, "getting engineers to work together instead of above planners." All of these comments suggest an ongoing split between planners and engineers serious enough that these respondents called it their greatest challenge.

To characterize the nature of the work done by respondents, the survey asked about the duties included in the respondent's current position (Table 3-6). Over three-fourths of respondents said their duties included analyzing project alternatives, conducting public involvement, developing long-range plans, and assessing the community impacts of transportation projects. About two-thirds of respondents said that their duties included prioritizing projects and analyzing and developing policy, just over half said their duties included assessing the environmental impacts of transportation projects, and about 30% of respondents said that developing neighborhood plans was included in their duties. Most respondents report multiple duties: the average respondent reports 5.2 of the 8 duties listed in the survey, and only 16% of respondents report fewer than three duties. Beyond the eight listed, respondents included duties such as forecasting and travel demand modeling, managing grants, developing training and education programs, reviewing zoning and regulation changes, and so on.

Table 3-6 Job Duties

Job Duties	Frequency	Percent
Analyze Project Alternatives	295	81.9%
Conduct Public Involvement	279	77.5%
Develop Long Range Plans	268	74.4%
Assess Community Impacts of Transportation Projects	265	73.6%
Prioritize Projects	241	66.9%
Analyze and Develop Policy	219	60.8%
Assess Environmental Impacts of Transportation Projects	196	54.4%
Develop Neighborhood Plans	108	30.0%
Other	123	34.2%

In another approach to characterizing the work of the respondents, the survey asked respondents to indicate to what share of their job they would describe as "planning" and what share as "engineering" (Figure 3-1). Fifty-nine percent said their jobs were "mostly planning," while 33% of respondents said "some planning"; only 7.2% of respondents said their jobs were "all planning." In contrast, only 34 or 10.7% of respondents described their jobs as "mostly engineering." This finding is not surprising, given the two listserves used to distribute the survey. Interestingly, though, 64% of respondents said that their jobs involved "some engineering." These results suggest that the practice of transportation planning today is defined by a balance between the fields of planning and engineering, even if traditional splits between academic programs and professional affiliations remain.

Not surprisingly, there is some correlation between type of job and type of degree (Table 3-7). While equal numbers of respondents with engineering jobs had masters degrees in planning and engineering, half of respondents with planning jobs had masters in planning and only 16.4% had masters in engineering. Respondents with planning jobs and masters degrees in planning accounted for 112 of the 341 respondents or one third of the entire sample, the largest single segment.

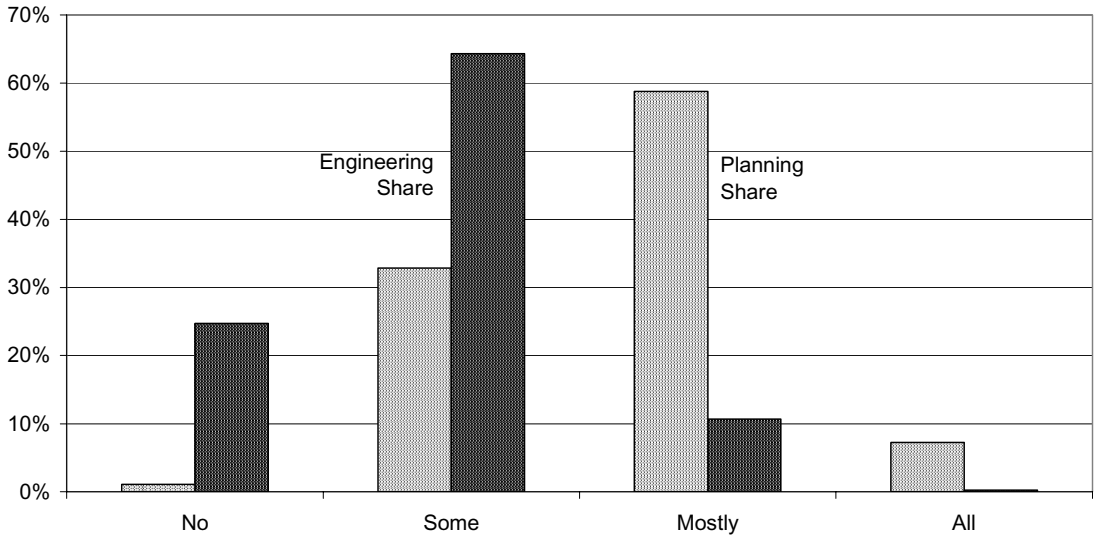

Figure 3-1 Share of job that is planning or engineering.

Table 3-7 Type of Job vs. Type of Degree

	Master's Degree				No	
Type of Job	Planning	Engineering	Joint/Dual	Other	Master's	Total*
Planning Job	112	36	4	23	45	220
	50.9%	16.4%	1.8%	10.5%	20.5%	100.0%
Engineering Job	7	8	0	4	15	34
	20.6%	23.5%	0.0%	11.8%	44.1%	100.0%
Planning and	37	12	2	14	22	87
Engineering Job	42.5%	13.8%	2.3%	16.1%	25.3%	100.0%
Total*	156	56	6	41	82	341
	45.7%	16.4%	1.8%	12.0%	24.0%	100.0%

* 19 missing

3.3 PROFESSIONAL NEEDS VS. ACADEMIC COURSES

In order to assess in more detail the match between the knowledge and skills needed for the respondents' current jobs and those provided by their formal degree programs, the survey asked a series of three questions. First, respondents were asked to rate the relative frequency with which they address a list of 25 topics and the relative importance of a list of 20 skills (both on a 5-point scale, with 5 equal to "daily" for topics or "very important" for skills). The respondents were later asked to indicate how much time was devoted to each topic or skill in their formal degree program, from "not covered," to "minor portion of course" to "major portion of course" to "full course." Finally, respondents were asked to indicate whether they think they received the right amount of exposure to the topic or skill in their formal degree programs. The results of these questions were analyzed first for the entire sample and then by type of job, type of degree, and time since graduation.

Topics

The top five topics in descending order of importance (as indicated by how frequently the topic is addressed on the job) were: regional transportation planning, transportation and land use connection, public involvement, multi-model integration, and travel demand forecasts (Table 3-8). The average score for almost half of the topics was three or more, indicating that the job "some times" addresses the topic. But when asked whether they had received the right amount of exposure to these topics, respondents indicated that their degree programs did not provide enough exposure to any of the 25 topics: no topic received an average rating equal to or above three, or "sufficient." For the five most important topics, the percentage of respondents

Table 3-8 Professional Needs vs. Academic Courses: Topics

Topics List	Average Importance in Job*	Portion of Course: Not Covered	Minor Portion	Major Portion	Full Course	Average Rating of Coverage **	Priority Score ***
Regional Transportation Planning	3.89	26.7%	33.4%	21.1%	18.8%	2.26	2.88
Transportation and Land Use Connection	3.75	15.7%	32.6%	32.9%	18.8%	2.30	2.63
Public Involvement	3.72	27.8%	41.9%	23.3%	7.0%	2.05	3.53
Multi-Modal Integration	3.44	31.8%	39.1%	23.2%	5.9%	2.20	2.75
Travel Demand Forecasts	3.31	35.1%	27.0%	21.9%	16.0%	2.18	2.71
Transit Planning	3.25	38.6%	33.2%	15.2%	13.0%	2.06	3.06
Safety	3.23	45.2%	40.2%	10.7%	3.9%	2.25	2.42
Land-Use Planning	3.17	11.2%	23.2%	26.9%	38.7%	2.62	1.20
Inter-Regional Transportation Planning	3.16	28.8%	35.8%	25.1%	10.3%	2.23	2.43
Bicycle and Pedestrian Planning	3.13	42.3%	47.9%	8.2%	1.7%	1.97	3.22
Environmental and Sustainability Issues	3.05	23.7%	39.4%	23.2%	13.7%	2.23	2.35
Travel Demand Management	2.94	45.5%	37.4%	14.0%	3.1%	2.08	2.70
Transportation System Management	2.87	45.5%	33.1%	18.5%	2.8%	2.19	2.32
Law and Regulation	2.87	13.6%	27.4%	20.1%	39.0%	2.61	1.12
Professional Ethics	2.83	18.0%	39.9%	25.3%	16.9%	2.68	0.91
Transportation Control Measures	2.75	51.3%	33.7%	11.6%	3.4%	2.09	2.50
Urban Design	2.72	20.4%	32.2%	24.9%	22.4%	2.49	1.39
Traffic Calming	2.68	61.7%	29.6%	8.2%	0.6%	2.03	2.60
Intelligent Transportation Systems	2.67	63.4%	26.3%	6.4%	3.9%	1.99	2.70
Neighborhood Planning	2.62	23.9%	33.1%	28.7%	14.3%	2.47	1.39
Americans with Disabilities Act	2.47	69.9%	27.9%	1.7%	0.8%	2.03	2.40
Goods Movement	2.42	43.7%	43.7%	10.1%	2.5%	2.05	2.30
Environmental Justice	2.42	58.8%	33.4%	5.3%	2.5%	2.05	2.30
Air Quality Conformity	2.27	64.3%	33.4%	1.4%	0.8%	1.86	2.59
Transportation History	1.94	31.2%	43.8%	16.3%	8.7%	2.58	0.81

* Rate: From "Never" (1) to "Daily" (5)

** Rate: From "Not Enough" (1) to "Too Much" (5)

*** Priority Score = (3.00 - Avg. Rating of Coverage) * Avg. Importance in Job

indicating that the topic was not covered or was only a minor portion of a course was surprisingly high: 60.1% for regional transportation planning, 48.3% for transportation and land use connection, 69.7% for public involvement, 70.9% for multi-modal integration, and 62.1% for travel demand forecasts. The topics with the highest share of respondents indicating that the topic was not covered in their degree programs were air quality conformity (64.3%) and the American's with Disabilities Act (69.9%), perhaps reflecting the relatively recent emergence of these topics in transportation planning. For safety and bicycle and pedestrian planning, the seventh and tenth most important topics, 85.4% and 90.2% of respondents, respectively, indicated that the topic was not covered or was a minor portion of a course.

A "priority score" was calculated for each topic by, first, taking the difference between an "adequate" rating of coverage (a score of three) and the average rating of the coverage to indicate the degree of deficiency in the coverage, and, second, multiplying this difference by the average

rating of the importance of the topic (Table 3-8). The priority score thus gives an indication of which topics are most in need of additional attention in transportation programs. The five topics with the highest priority scores were, in descending order: public involvement, bicycle and pedestrian planning, transit planning, regional transportation planning, and multi-modal integration. It is interesting and perhaps not surprising that all of these topics were given new emphasis in ISTEA.

But how much time should transportation programs spend on these topics? To answer this question, the distribution of responses on the portion of a course devoted to the topics was estimated for only those respondents who said that the coverage of the topic was "about right" (Table 3-9). Topics that seem to merit a full course or close to it, according to the respondents, include land-use planning and law and regulation. Regional transportation planning, transportation and land use connection, travel demand forecasts, transit planning, land use

Table 3-9 Right Portion of a Course: Topics

	Share with	Portion of Course			
	Just Right	Not	Minor	Major	Full
Topics List	Coverage	Covered	Portion	Portion	Course
Regional Transportation Planning	40.3%	3.4%	21.4%	44.8%	30.3%
Transportation and Land Use Connection	37.5%	2.2%	20.0%	46.7%	31.1%
Public Involvement	33.3%	9.2%	37.5%	37.5%	15.8%
Multi-Modal Integration	37.5%	13.3%	34.8%	41.5%	10.4%
Travel Demand Forecasts	31.1%	12.5%	22.3%	38.4%	26.8%
Transit Planning	32.5%	12.0%	29.1%	29.9%	29.1%
Safety	40.0%	30.6%	43.8%	18.8%	6.9%
Land-Use Planning	46.9%	1.8%	13.0%	36.7%	48.5%
Inter-Regional Transportation Planning	40.0%	12.5%	34.7%	38.2%	14.6%
Bicycle and Pedestrian Planning	29.2%	27.6%	50.5%	19.0%	2.9%
Environmental and Sustainability Issues	40.3%	13.1%	34.5%	29.0%	23.4%
Travel Demand Management	35.6%	22.7%	46.9%	25.8%	4.7%
Transportation System Management	37.8%	20.6%	42.6%	30.9%	5.9%
Law and Regulation	49.4%	3.9%	25.3%	19.7%	51.1%
Professional Ethics	49.7%	7.3%	40.8%	30.7%	21.2%
Transportation Control Measures	33.6%	33.1%	38.8%	21.5%	6.6%
Urban Design	41.7%	10.7%	24.0%	34.0%	31.3%
Traffic Calming	31.9%	40.0%	41.7%	16.5%	1.7%
Intelligent Transportation Systems	28.3%	43.1%	43.1%	9.8%	3.9%
Neighborhood Planning	44.2%	12.6%	29.6%	39.0%	18.9%
Americans with Disabilities Act	34.4%	54.8%	38.7%	4.0%	2.4%
Goods Movement	35.3%	33.9%	48.0%	11.8%	6.3%
Environmental Justice	32.2%	37.1%	44.0%	12.9%	6.0%
Air Quality Conformity	30.8%	52.3%	41.4%	3.6%	2.7%
Transportation History	47.5%	17.5%	53.8%	20.5%	8.2%

planning, professional ethics, urban design, and neighborhood planning should be covered as at least a major portion of a course, according to a majority of these respondents. On the topic of public involvement, equal shares of respondents indicated that a minor portion of a course was just about right and that a major portion of a course was just about right.

Skills

The top five skills in descending order of importance were: public speaking, data presentation, working with the public, technical writing, and writing for the public (Table 3-10). The average rating of importance was over 3, or "somewhat important," for fourteen of the twenty skills, and seven had an average rating of over 4. But when asked whether they had received the right amount of training in these skills, respondents indicated that their degree programs did not provide enough exposure to any of the 20 skills: no skill received an average rating equal to or above three, or "sufficient." For several of the most important skills, the share of respondents indicating that the skill was not covered in their degree programs was relatively high: 29.0% for working with the public, 32.1% for writing for the public, 46.6% for meeting facilitation, and 45.7% for budget preparation. Only for data presentation, technical writing, and data collection did more than half of the respondents indicate that these skills were a major portion of a course or a full course. The lowest average scores on the rating of coverage were for budget preparation, Transcad software, and Geographic Information Systems (GIS). As for the lowest scoring topics, the scores for the latter two skills may reflect their relatively recent emergence as important tools for transportation planners.

The "priority scores" for skills, calculated using the same procedure as for topics, shows more variation in priorities than did the scores for topics and more pressing needs on certain skills than was seen for any topic (Table 3-10). The skills with the highest priority for more coverage in transportation programs were, in descending order: budget preparation, working with the public, public speaking, writing for the public, and Geographic Information Systems. That three skills are tied to public involvement suggests a serious gap between the importance of these skills in transportation planning today and the training that transportation programs have traditionally provided to their students.

But how much time should transportation programs devote to these skills? To answer this question, the distribution of responses on the portion of a course devoted to the skills was

Table 3-10 Professional Needs vs. Academic Courses: Skills

Skills List	Average Importance in Job*	Portion of Course: Not Covered	Minor Portion	Major Portion	Full Course	Average Rating of Coverage **	Priority Score ***
Public Speaking	4.54	16.8%	37.2%	27.1%	19.0%	2.24	3.45
Data Presentation	4.49	5.8%	30.4%	47.6%	16.2%	2.69	1.39
Working with the Public	4.47	29.0%	40.9%	22.6%	7.5%	2.13	3.89
Technical Writing	4.37	14.9%	32.3%	30.3%	22.5%	2.50	2.19
Writing for the Public	4.31	32.1%	36.6%	23.4%	7.9%	2.23	3.32
Data Collection	4.08	5.6%	32.1%	47.2%	15.1%	2.77	0.94
Meeting Facilitation	4.08	46.6%	36.6%	13.7%	3.1%	2.06	3.84
Budget Preparation	3.63	45.7%	35.7%	10.6%	8.1%	1.90	3.99
Statistical Analysis	3.50	2.8%	15.9%	29.8%	51.5%	2.85	0.53
Geographic Information Systems	3.42	52.4%	18.1%	10.3%	19.2%	1.99	3.45
Traffic Impact Analysis	3.35	48.0%	33.7%	13.8%	4.5%	2.10	3.02
Environmental Impact Analysis	3.19	30.7%	43.9%	16.5%	8.9%	2.18	2.62
Travel Demand Modeling	3.11	42.1%	24.4%	19.1%	14.3%	2.17	2.58
Cost-Benefit Analysis	3.10	12.8%	42.2%	34.1%	10.9%	2.34	2.05
System Design	2.98	45.3%	33.0%	15.6%	6.1%	2.26	2.21
Facility Design	2.94	39.5%	36.7%	12.9%	10.9%	2.30	2.06
Survey Administration	2.94	19.6%	40.8%	30.2%	9.5%	2.54	1.35
Highway Capacity Manual Software	2.74	64.0%	19.0%	10.1%	7.0%	2.09	2.49
Population Forecasting	2.68	27.3%	38.4%	25.1%	9.2%	2.53	1.26
Transcad Software	1.97	88.4%	7.9%	1.7%	2.0%	1.92	2.13

* Rate: From "Not Important" (1) to "Very Important" (5)

** Rate: From "Not Enough" (1) to "Too Much" (5)

*** Priority Score = (3.00 - Avg. Rating of Coverage) * Avg. Importance in Job

estimated for only those respondents who said that the coverage of the skill was “about right” (Table 3-11). Statistical analysis gets the highest share of these respondents indicating that a full course is appropriate. A majority of these respondents indicates that public speaking, data presentation, working with the public, technical writing, data collection, geographic information systems, travel demand modeling, and cost-benefit analysis merit at least a major portion of a course.

Table 3-11 Right Portion of a Course: Skills

Skills List	Share with Just Right Coverage	Portion of Course: Not Covered	Minor Portion	Major Portion	Full Course
Public Speaking	41.9%	7.9%	24.5%	39.7%	27.8%
Data Presentation	58.1%	1.4%	25.4%	55.5%	17.7%
Working with the Public	31.9%	13.0%	33.9%	37.4%	15.7%
Technical Writing	51.9%	7.0%	22.5%	39.6%	31.0%
Writing for the Public	40.3%	15.9%	37.9%	33.1%	13.1%
Data Collection	60.8%	1.8%	24.2%	57.5%	16.4%
Meeting Facilitation	32.8%	21.2%	46.6%	26.3%	5.9%
Budget Preparation	26.9%	12.4%	41.2%	25.8%	20.6%
Statistical Analysis	59.7%	0.0%	10.2%	31.2%	58.6%
Geographic Information Systems	29.2%	20.0%	18.1%	22.9%	39.0%
Traffic Impact Analysis	33.9%	27.0%	35.2%	30.3%	7.4%
Environmental Impact Analysis	33.6%	10.7%	45.5%	26.4%	17.4%
Travel Demand Modeling	34.7%	16.8%	26.4%	32.0%	24.8%
Cost-Benefit Analysis	46.1%	0.6%	33.1%	50.6%	15.7%
System Design	41.7%	26.7%	35.3%	26.0%	12.0%
Facility Design	37.5%	31.9%	33.3%	16.3%	18.5%
Survey Administration	51.7%	10.2%	38.7%	39.8%	11.3%
Highway Capacity Manual Software	35.3%	43.3%	24.4%	20.5%	11.8%
Population Forecasting	48.9%	13.1%	39.2%	35.8%	11.9%
Transcad Software	31.7%	84.2%	9.6%	2.6%	3.5%

Wished-For Courses

In order to further identify gaps between job needs and formal education, the survey gave respondents an opportunity to write-in what classes they did not take that they wish they had taken and what classes they wish they had been offered but were not. Because these questions were open-ended rather than prompted, the results can be taken as a low estimate of the share of respondents who might have wished-for these courses if directly asked. The open-ended responses were categorized so as to reveal patterns and make sense of the results. As shown in Table 3-12, the most frequent category of courses that respondents said were offered but they wished they had taken was geographic information system and remote sensing, closely followed by traffic engineering and geometric design and transportation modeling. These responses suggest a need for more exposure to technical tools and topics, mostly likely in transportation planning programs rather than transportation engineering programs. The most frequent categories of courses that respondents said they wished had been offered included these categories, but transportation planning was at the top of the list. This result may echo the finding

in the curricula survey, summarized in Chapter 5, that only about half of planning programs offer transportation planning courses.

Degree Programs vs. Other Forms of Education

Table 3-12 Wished-For Courses

	Wish Had Taken		Wish Had Offered	
Courses/Topics List	Count	Pct	Count	Pct
GIS, Remote Sensing	24	10%	25	9%
Traffic Engineering, Geometric Design	23	9%	19	7%
Transportation Modeling	21	8%	24	9%
Transportation Planning	16	6%	37	14%
Statistics, Survey Methods	14	6%	2	1%
Communication	14	6%	13	5%
Finance, Budgets	12	5%	14	5%
Administration, Project Management	11	4%	9	3%
Environmental Issues	10	4%	11	4%
Land use, Site Design, Real Estate	9	4%	9	3%
Planning Courses or Degree	9	4%	5	2%
Economics, Economic Development	8	3%	2	1%
Law	7	3%	3	1%
Urban Design, Landscape Architecture	4	2%	3	1%
ITS	3	1%	4	2%
Transit Planning	3	1%	11	4%
Math	3	1%	0	0%
Organizational Behavior	2	1%	3	1%
Public Involvement	2	1%	14	5%
Policy Analysis	2	1%	2	1%
History	2	1%	1	0%
Ethics	1	0%	3	1%
Cost-Benefit Analysis	1	0%	2	1%
Transportation - Land Use Connection	1	0%	5	2%
Agency Roles	0	0%	3	1%
Bicycle and Pedestrian Planning	0	0%	7	3%
Environmental Justice, Other New Topics	0	0%	4	2%
Other	19	8%	12	5%
Lots of topics	6	2%	6	2%
Too Long Ago to Say	11	4%	6	2%
Degree in Different Field	7	3%	3	1%
None	6	2%	4	2%
Total	251		266	
Number of Respondents Listing...				
One Course	137	55%	127	48%
Two Courses	33	13%	38	14%
Three Courses	16	6%	21	8%

The survey asked respondents about the importance of their formal degree programs in providing the skills and knowledge necessary for their current jobs and about the importance of other forms of education (Table 3-13). On a scale of 1 to 5, with 1 equal to "not at all important" and 5 equal to "very important," respondents rated their formal degree programs a 4.0 on average. However, informal on-the-job training from supervisors or colleagues and personal experience were both rated higher, at 4.4 and 4.6, respectively. Continuing education programs, employer-provided training, and professional workshops were rated 3.2, 3.4, and 3.7 on average, respectively. In addition, the survey asked respondents if they agreed that "A planning degree is excellent preparation for the job duties of a transportation planner." The average score on a 5-point Likert scale (1 equal to "strongly disagree," 5 equal to "strongly agree") was 3.4, with 35% of respondents saying they agreed somewhat with the statement and 14% saying that they strongly agreed (Table 3-14). These results suggest a relatively positive assessment of transportation planning curricula but also significant room for improvement.

Table 3-13 Importance of Sources of Education or Training

Sources List	Average Assessment*
Personal Experience	4.59
Informal on-the-Job Training from Supervisor/Colleagues	4.36
Formal Degree Program	3.96
Professional Workshops	3.74
Employer-Provided Training	3.43
Continuing Education Program	3.22

* Rate: From "Not at All Important" (1) to "Very Important" (5)

Table 3-14 Planning Degree is Excellent Preparation

Average Agreement**	3.4
Share by degree of agreement:	
Strongly Agree	13.9%
Agree	35.3%
Neutral	29.7%
Disagree	15.7%
Strongly Disagree	5.3%
Total (Missing: 23 out of 360)	100.0%

* Agreement with the statement that "A planning degree is excellent preparation for the job duties of a transportation planner."

** 5-point Likert scale where 1=strongly disagree, 5=strongly agree.

3.4. PROFESSIONAL NEEDS VS. COURSES: PLANNING VS. ENGINEERING JOBS

The match between knowledge and skills important to the job and those provided by formal degree programs is likely to vary by type of respondent, particularly by planning versus engineering job, planning versus engineering degree, and time since graduation. For respondents with jobs that are predominantly planning (as defined in Section 3.2) and those with jobs that are predominantly engineering, differences are especially likely on the ratings of the importance of different topics and skills to their current jobs. Differences in coverage might also be seen, given the correlation between type of job and type of degree. Differences in both importance and coverage would then carry over to the priority score for the topics and skills. These hypotheses are examined below through tests of the statistical significance of the differences between respondents with planning jobs and those with engineering jobs.

Topics

A comparison of the average rating of the importance of the topics between respondents in planning versus engineering jobs shows significant differences on 14 of the 25 topics (Table 3-15). Respondents with planning jobs rated all but three of the topics with significant differences as equally important or more important as those with engineering jobs; the three exceptions were safety, transportation control measures, and traffic calming, topics more traditionally within the purview of transportation engineering. The fact that respondents with planning jobs rated most topics of more importance than respondents with engineering jobs reflects the emphasis of this survey on transportation planning and perhaps provides some validation of the appropriateness of the list of topics. As interesting as the topics that the two groups rated differently are the topics where the differences between the groups were not statistically significant, including travel demand forecasting, travel demand management, and professional ethics. And although the differences were statistically significant for regional transportation planning, the transportation land use connection, and public involvement, both groups rates these topics more than "somewhat important." The results suggest both important difference and important similarities in the job needs for respondents with planning degrees and those with engineering degrees.

The differences on reported coverage of these topics for respondents with planning jobs and those with engineering jobs probably reflects a correlation with type of degree, where

respondents with engineering jobs are much more likely to also have an engineering degree (see Table 3-7). Respondents with planning jobs were much more likely to indicate that travel demand forecasts, safety, and transportation control measures were not covered in their degree programs (Table 3-15). Respondents with engineering jobs were more likely to indicate that land use planning, environmental and sustainability issues, and neighborhood planning were not

Table 3-15 Professional Needs vs. Academic Courses for Topics: Planning vs. Engineering Jobs

	Average Importance in Jobs*		Not Covered		Average Rating of Coverage**		Priority Score***	
Topics List	Plan. Job	Eng. Job	Plan. Job	Eng. Job	Plan. Job	Eng. Job	Plan. Job	Eng. Job
Regional Transportation Planning	4.08	3.32	17.2%	16.7%	2.31	2.47	2.80	1.75
Transportation and Land Use Connection	3.99	3.41	12.5%	19.4%	2.30	2.36	2.80	2.18
Public Involvement	3.86	3.47	26.7%	36.1%	2.02	2.08	3.78	3.18
Multi-Modal Integration	3.70	2.64	29.1%	33.3%	2.26	2.19	2.73	2.13
Travel Demand Forecasts	3.49	3.18	35.8%	19.4%	2.13	2.50	3.02	1.59
Transit Planning	3.46	2.56	39.2%	30.6%	2.03	2.33	3.34	1.71
Land-Use Planning	3.41	2.77	7.7%	19.4%	2.76	2.00	0.82	2.77
Inter-Regional Transportation Planning	3.33	2.92	26.0%	27.8%	2.26	2.31	2.48	2.03
Bicycle and Pedestrian Planning	3.32	2.82	38.6%	42.9%	1.98	2.00	3.39	2.82
Environmental and Sustainability Issues	3.26	2.68	19.7%	36.1%	2.23	2.19	2.50	2.16
Safety	3.18	3.85	49.1%	19.4%	2.24	2.56	2.42	1.71
Travel Demand Management	3.03	2.82	45.7%	30.6%	2.07	2.26	2.82	2.09
Professional Ethics	3.00	2.92	16.8%	22.9%	2.72	2.33	0.85	1.95
Law and Regulation	2.97	2.51	12.2%	17.1%	2.68	2.50	0.95	1.26
Transportation System Management	2.94	2.92	46.4%	30.6%	2.16	2.46	2.46	1.59
Urban Design	2.82	2.76	19.7%	22.2%	2.56	2.40	1.23	1.66
Neighborhood Planning	2.78	2.82	18.0%	33.3%	2.54	2.24	1.28	2.16
Transportation Control Measures	2.76	3.36	54.3%	33.3%	2.09	2.17	2.50	2.78
Traffic Calming	2.69	3.03	60.6%	63.9%	2.04	2.09	2.57	2.77
Environmental Justice	2.62	1.64	57.3%	63.9%	2.00	2.20	2.63	1.31
Intelligent Transportation Systems	2.61	2.85	60.7%	63.9%	2.06	2.00	2.45	2.85
Americans with Disabilities Act	2.57	2.45	68.5%	83.3%	2.02	2.20	2.51	1.96
Goods Movement	2.48	2.44	43.8%	27.8%	2.02	2.22	2.44	1.90
Air Quality Conformity	2.42	1.87	61.7%	69.4%	1.86	2.06	2.77	1.76
Transportation History	2.00	1.74	29.4%	27.8%	2.62	2.53	0.77	0.82

Note: Highlighting indicates a statistically significant difference at the 95% confidence level between respondents with planning (n=237) and engineering (n=39) jobs.

* Rate: From "Never" (1) to "Daily" (5)

** Rate: From "Not Enough" (1) to "Too Much" (5)

*** Priority Score = (3.00 - Avg. Rating of Coverage) * Avg. Importance in Job

covered. High shares of both groups indicated that traffic calming, environmental justice, intelligent transportation systems, Americans with Disabilities Act, and air quality conformity were not covered, probably reflecting the relatively recent emphasis on these topics in transportation planning. The average rating of coverage for both groups on most topics was between 2 and 3, something less than but often close to "just about right."

The differences in priority scores reflect a combination of the differences in the ratings of importance and the differences in the ratings of coverage. Respondents with planning jobs gave significantly higher priority to transit planning, travel demand forecasts, air quality conformity,

environmental justice, and transportation system management. Although air quality conformity and environmental justice are relatively new concerns for the field, the priority given to the traditional topics of transit planning and travel demand forecasts suggests a gap in planning programs. The fact that respondents with engineering jobs gave significantly higher priority to land-use planning is consistent with the correlation between engineering job and engineering degree (see Table 3-7).

Skills

Only six of the twenty skills showed significant differences in importance between respondents with planning jobs and those with engineering jobs (Table 3-16). Respondents with planning jobs rated meeting facilitation, geographic information systems, and population forecasting as more important than those with engineering jobs did, while those with engineering jobs rated traffic impact analysis, facility design, and highway capacity manual software as more important than those with planning jobs did. These differences are consistent with traditional differences between planning and engineering responsibilities. But both groups rated public

Table 3-16 Professional Needs vs. Academic Courses for Skills: Planning vs. Engineering Jobs

	Average Importance in Jobs*		Not Covered		Average Rating of Coverage**		Priority Score***	
Topics List	Plan. Job	Eng. Job	Plan. Job	Eng. Job	Plan. Job	Eng. Job	Plan. Job	Eng. Job
Public Speaking	4.61	4.44	13.2%	19.4%	2.25	2.03	3.47	4.32
Working with the Public	4.61	4.26	25.6%	44.4%	2.10	2.09	4.17	3.89
Data Presentation	4.60	4.29	5.1%	8.3%	2.72	2.64	1.30	1.55
Writing for the Public	4.43	4.15	26.0%	54.3%	2.23	2.22	3.42	3.23
Technical Writing	4.42	4.50	12.9%	13.9%	2.52	2.58	2.10	1.88
Meeting Facilitation	4.24	3.67	41.5%	58.3%	2.07	1.94	3.95	3.87
Data Collection	4.14	4.18	3.4%	11.1%	2.77	2.78	0.95	0.93
Budget Preparation	3.63	3.90	44.4%	50.0%	1.87	2.08	4.12	3.58
Geographic Information Systems	3.56	3.10	51.3%	61.1%	2.02	1.94	3.48	3.28
Statistical Analysis	3.51	3.41	3.0%	0.0%	2.85	2.83	0.53	0.57
Environmental Impact Analysis	3.35	3.38	28.3%	33.3%	2.19	2.19	2.71	2.72
Traffic Impact Analysis	3.34	4.38	48.9%	36.1%	2.13	2.31	2.92	3.04
Travel Demand Modeling	3.24	3.21	43.3%	19.4%	2.16	2.40	2.71	1.93
Cost-Benefit Analysis	3.22	2.92	13.7%	13.9%	2.32	2.43	2.19	1.67
System Design	3.08	3.13	44.2%	30.6%	2.23	2.56	2.38	1.39
Facility Design	3.00	3.69	40.3%	19.4%	2.26	2.66	2.22	1.27
Survey Administration	2.97	2.90	16.3%	19.4%	2.53	2.56	1.38	1.29
Population Forecasting	2.86	2.18	23.1%	38.9%	2.59	2.33	1.17	1.45
Highway Capacity Manual Software	2.68	4.21	65.7%	38.9%	2.04	2.58	2.59	1.75
Transcad Software	2.07	2.19	89.0%	88.6%	1.94	1.94	2.19	2.32

Note: Highlighting indicates a statistically significant difference at the 95% confidence level between respondents with planning (n=237) and engineering (n=39) jobs.

* Rate: From "Never" (1) to "Daily" (5)

** Rate: From "Not Enough" (1) to "Too Much" (5)

*** Priority Score = (3.00 - Avg. Rating of Coverage) * Avg. Importance in Job

speaking, working with the public, data presentation, writing for the public, and data collection as very important, suggesting important similarities between planning and engineering jobs.

The percent of respondents indicating that a skill was not covered in their formal degree programs was relatively consistent between the groups. A greater share of respondents with engineering jobs said that working with the public and writing for the public were not covered, while a greater share of respondents with planning jobs said that travel demand modeling, facility design, and highway capacity manual software were not covered in their programs. These differences most likely reflect the correlation between type of job and type of degree earned (see Table 3-7). As was the case for topics, the average ratings of coverage for skills were mostly between 2 and 3, or close to but not quite "just about right," and were largely consistent between the two groups. This consistency suggests that some difference in coverage of skills is justified given the different needs of planning jobs and engineering jobs. The lower ratings of coverage by respondents with planning jobs for system design, facility design, and highway capacity manual software, however, suggest that planners need more technical training than they're getting.

Priority scores differed significantly only for system design. All respondents gave high priority to public speaking, working with the public, writing for the public, meeting facilitation, and budget preparation – skills that are important for both planning and engineering jobs and that neither planning nor engineering programs seem to be adequately providing to their students.

Wished-For Courses

Courses that respondents said they wished they had taken or that they wished had been offered seem to differ significantly for those with planning jobs and those with engineering jobs, although the number of responses on this question for respondents with engineering jobs is too low for statistical testing (Table 3-17). The responses for those with planning jobs mirror the results for the overall sample (see Table 3-12): GIS and remote sensing, modeling, traffic engineering and geometric design. The fact that so many respondents with planning jobs said they wished that a course on transportation planning had been offered may reflect the fact that a notable share of respondents with planning jobs have degrees in a field other than planning as well as the fact that a notable share of planning programs do not offer transportation courses (as

discussed in Chapter 5). Public involvement was also high on the list of courses that respondents with planning jobs wished had been offered.

Table 3-17 Wished-For Courses: Planning vs. Engineering Jobs

	Planning Job (n=237)		Engineering Job (n=39)	
	Wish Had Taken	Wish Had Offered	Wish Had Taken	Wish Had Offered
Courses/Topics List	Count	Count	Count	Count
GIS, Remote Sensing	22	18	0	0
Modeling	18	19	0	3
Traffic Engineering, Geometric Design	16	14	1	2
Transportation Planning	11	24	0	0
Environmental Issues	9	7	0	2
Finance, Budgets	9	9	1	0
Communication	8	9	3	1
Statistics, Survey Methods	7	2	1	0
Administration, Project Management	7	8	3	0
Economics, Economic Development	5	1	0	0
Planning Courses or Degree	5	2	1	0
Urban Design, Landscape Architecture	4	2	0	0
Law	4	1	0	0
ITS	3	1	0	2
Land use, Site Design, Real Estate	3	6	2	0
Transit Planning	3	9	0	0
Math	2	0	0	0
Organizational Behavior	1	2	0	0
Public Involvement	1	10	0	1
Policy Analysis	1	1	0	0
History	1	1	0	0
Cost-Benefit Analysis	1	2	0	0
Transportation - Land Use Connection	1	4	0	1
Agency Roles	0	2	0	0
Ethics	0	2	0	0
Bicycle and Pedestrian Planning	0	3	0	0
Environmental Justice, Other New Topics	0	2	0	1
Other	14	8	3	2
Lots	3	5	2	1
Too Long Ago to Say	9	3	1	3
Degree in Different Field	3	2	2	0
None	4	1	0	0
Number of Respondents Listing...				
One Course	91	86	11	14
Two Courses	24	26	0	1
Three Courses	12	14	3	2

Importance of Sources of Education

Both respondents with planning jobs and those with engineering jobs indicated that their formal degree programs were important forms of education for their current jobs, but both also rated personal experience and informal on-the-job training as more important than their degree programs (Table 3-18). The only statistically significant difference was for informal on-the-job training, which respondents with engineering jobs rated as more important than those with planning jobs did.

Table 3-18 Importance of Sources of Education or Training: Planning vs. Engineering Job

Sources List	Planning Job (n=237) Average Assessment*	Engineering Job (n=39) Average Assessment*
Personal Experience	4.64	4.64
Informal on-the-Job Training from Supervisor/Colleagues	4.44	4.74
Formal Degree Program	4.00	3.97
Professional Workshops	3.78	4.00
Employer-Provided Training	3.47	3.74
Continuing Education Program	3.28	3.59

Note: Highlighting indicates statistically significant differences at the 95% confidence level between respondents with planning and engineering jobs.

* Rate: From "Not at All Important" (1) to "Very Important" (5)

3.5. PROFESSIONAL NEEDS VS. COURSES: PLANNING VS. ENGINEERING DEGREES

The match between professional needs and academic programs may also depend on the type of academic program the respondent attended, particularly whether the respondent completed a master's in planning or a master's in engineering. Differences are especially likely between these two groups on the coverage of topics and skills. Because of the correlation between type of job and type of degree, some difference on the importance of topics and skills to the current job of the respondent is also possible. Any differences then carry over to the priorities given to different skills and topics for expanded coverage in degree programs.

Topics

For respondents with masters in planning, the top five topics in descending order of importance were: regional transportation planning, transportation and land use connection, public involvement, multi-modal integration, and transit planning (Table 3-19). For respondents with masters in engineering, the top five topics were: travel demand forecasting, regional transportation planning, transportation and land use connection, public involvement, and safety. The differences in importance between the two groups were significant for only six of the twenty-five topics: bicycle and pedestrian planning and environmental justice were more important for respondents with planning degrees, while travel demand forecasts, intelligent transportation systems, transportation control measures, and, surprisingly, neighborhood planning were more important for respondents with engineering degrees. These differences probably reflect the correlation between type of job and type of degree and are consistent with traditional divisions between planning and engineering.

Table 3-19 Professional Needs vs. Academic Courses for Topics: Planning vs. Engineering Degrees

	Avg. Importance in Jobs*		Not Covered		Average Rating of Coverage**		Priority Score***	
Topics List	Plan. Master's	Eng. Master's	Plan. Master's	Eng. Master's	Plan. Master's	Eng. Master's	Plan. Master's	Eng. Master's
Regional Transportation Planning	3.97	3.84	14.9%	5.4%	2.32	2.87	2.70	0.50
Transportation and Land Use Connection	3.81	3.82	7.1%	12.7%	2.38	2.66	2.36	1.30
Public Involvement	3.70	3.55	14.8%	46.4%	2.18	1.80	3.03	4.26
Multi-Modal Integration	3.53	3.40	25.0%	14.3%	2.31	2.54	2.44	1.56
Transit Planning	3.37	3.24	28.4%	17.9%	2.06	2.59	3.17	1.33
Travel Demand Forecasts	3.27	3.93	29.7%	5.4%	2.19	2.95	2.65	0.20
Land-Use Planning	3.18	2.98	1.3%	10.7%	2.87	2.55	0.41	1.34
Safety	3.17	3.44	51.0%	5.5%	2.29	2.75	2.25	0.86
Inter-Regional Transportation Planning	3.16	3.13	23.7%	14.3%	2.30	2.62	2.21	1.19
Bicycle and Pedestrian Planning	3.13	2.82	36.4%	39.3%	2.01	2.14	3.10	2.43
Environmental and Sustainability Issues	3.03	2.75	12.9%	37.5%	2.31	2.25	2.09	2.06
Transportation System Management	2.94	3.00	39.0%	17.9%	2.24	2.78	2.23	0.66
Travel Demand Management	2.94	3.18	36.8%	26.8%	2.15	2.65	2.50	1.11
Law and Regulation	2.90	2.63	4.5%	20.8%	2.86	2.39	0.41	1.60
Professional Ethics	2.78	2.80	7.7%	34.0%	2.89	2.50	0.31	1.40
Urban Design	2.66	2.82	9.1%	32.1%	2.60	2.42	1.06	1.64
Intelligent Transportation Systems	2.65	2.98	57.7%	48.2%	2.03	2.33	2.57	2.00
Transportation Control Measures	2.65	3.15	47.1%	28.3%	2.03	2.63	2.57	1.17
Traffic Calming	2.58	2.78	52.9%	50.0%	2.15	2.30	2.19	1.95
Americans with Disabilities Act	2.51	2.38	63.5%	82.1%	2.07	2.02	2.33	2.33
Environmental Justice	2.49	1.98	47.4%	73.2%	2.18	2.00	2.04	1.98
Neighborhood Planning	2.49	2.91	12.3%	29.1%	2.64	2.57	0.90	1.25
Goods Movement	2.39	2.66	43.5%	19.6%	2.14	2.30	2.06	1.86
Air Quality Conformity	2.27	2.04	54.6%	76.8%	2.00	1.85	2.27	2.35
Transportation History	1.92	1.89	20.6%	17.9%	2.79	2.71	0.40	0.55

Note: Highlighting indicates a statistically significant difference at the 95% confidence level between respondents with planning (n=158) and engineering (n=56) degrees.

* Rate: From "Never" (1) to "Daily" (5)

** Rate: From "Not Enough" (1) to "Too Much" (5)

*** Priority Score = (3.00 - Avg. Rating of Coverage) * Avg. Importance in Job

The differences between the two groups on the share of respondents reporting that the topics was not covered and the average rating of the coverage were more significant, as expected. For example, only 14.8% of respondents with planning degrees said that public involvement was not covered, compared with 46.4% of respondents with engineering degrees. Similarly, only 12.9% of respondents with planning degrees said that environmental and sustainability issues were not covered, compared with 37.5% of respondents with engineering degrees. Not surprisingly, higher shares of respondents with planning degrees said that travel demand forecasts, safety, transportation system management, transportation control measures, and goods movement were not covered in their programs. Higher shares of respondents with engineering degrees said that public involvement, land-use planning, environmental and sustainability issues, law and regulation, professional ethics, urban design, Americans with Disabilities Act, environmental justice, neighborhood planning, and air quality conformity were not covered in their programs. Note that 45% or more of both groups said that intelligent transportation systems, Americans with Disabilities Act, environmental justice, and air quality conformity were not covered in their degree programs, probably reflecting the relatively recent emphasis on these topics in transportation planning.

The average rating of coverage was between 2 and 3, or something less than "about the right amount," for almost all topics for both groups. Respondents with planning masters rated the coverage of their top five most important topics below 2.4 on average, indicating a notable degree of dissatisfaction with the coverage of these topics in planning programs. In contrast, respondents with engineering degrees rated the coverage of their top five most important topics above 2.5, with the exception of public involvement, which they rated only 1.80 on average. Respondents with engineering degrees rated the coverage of travel demand forecasts 2.95 on average, the highest for all topics for both groups, while planning masters rated the topic only 2.19 on average. Differences between the two groups were statistically significant for twelve out of the twenty-five topics: respondents with planning degrees had higher ratings of coverage on public involvement, land-use planning, law and regulation, and professional ethics; respondents with engineering degrees had higher ratings of coverage on regional transportation planning, transit planning, travel demand forecasts, safety, travel demand management, and transportation control measures.

The "priority scores" between the two groups are dramatically different. For respondents with engineering degrees, public involvement had by far the highest score, at 4.26, reflecting the importance of this topic and the poor coverage in engineering programs. The second highest priority score for this group was 2.43 for bicycle and pedestrian planning. For respondents with planning degrees, three topics emerged as relatively high priorities: transit planning, bicycle and pedestrian planning, and public involvement. Other topics with high scores for this group were regional transportation planning, travel demand forecasts, intelligent transportation systems, and transportation control measures. These results suggest that both planning and engineering programs need to devote more time to public involvement and that planning programs should consider more attention to technical topics more typically covered in engineering programs.

Skills

For respondents with planning degrees, the top five skills in descending order of importance were: data presentation, public speaking, working with the public, technical writing, and writing for the public (Table 3-20). For engineering masters the top five were: technical

Table 3-20 Professional Needs vs. Academic Courses for Skills: Planning vs. Engineering Degrees

	Avg. Importance in Jobs*		Not Covered		Average Rating of Coverage**		Priority Score***	
Skills List	Plan. Master's	Eng. Master's	Plan. Master's	Eng. Master's	Plan. Master's	Eng. Master's	Plan. Master's	Eng. Master's
Data Presentation	4.52	4.61	4.5%	7.1%	2.77	2.60	1.04	1.84
Public Speaking	4.51	4.64	14.7%	30.4%	2.27	2.02	3.27	4.56
Working with the Public	4.40	4.50	14.1%	60.7%	2.18	1.89	3.61	4.98
Technical Writing	4.32	4.71	17.4%	12.5%	2.53	2.29	2.02	3.34
Writing for the Public	4.17	4.20	23.4%	61.1%	2.23	1.89	3.20	4.66
Data Collection	4.13	4.16	2.6%	0.0%	2.77	2.88	0.93	0.52
Meeting Facilitation	4.05	4.02	36.8%	71.4%	2.17	1.88	3.35	4.52
Statistical Analysis	3.59	3.48	1.3%	0.0%	2.88	3.04	0.42	0.00
Geographic Information Systems	3.53	3.41	34.0%	69.6%	2.18	1.94	2.91	3.60
Budget Preparation	3.47	3.98	39.1%	57.1%	1.86	1.77	3.96	4.90
Traffic Impact Analysis	3.16	3.86	49.4%	17.9%	2.05	2.69	3.00	1.19
Cost-Benefit Analysis	3.07	3.32	5.1%	3.6%	2.42	2.36	1.77	2.13
Survey Administration	3.05	3.00	9.7%	28.6%	2.65	2.68	1.06	0.96
Environmental Impact Analysis	3.02	3.25	21.2%	41.1%	2.27	2.11	2.21	2.90
Travel Demand Modeling	3.01	3.88	36.8%	5.4%	2.13	2.95	2.63	0.21
System Design	2.97	3.18	45.2%	21.4%	2.29	2.70	2.12	0.96
Facility Design	2.75	3.46	44.2%	10.7%	2.26	2.63	2.04	1.30
Population Forecasting	2.66	2.64	9.0%	30.4%	2.81	2.42	0.49	1.54
Highway Capacity Manual Software	2.50	3.36	69.0%	30.4%	2.05	2.75	2.38	0.86
Transcad Software	1.96	2.16	87.1%	81.5%	1.90	2.16	2.16	1.82

Note: Highlighting indicates a statistically significant difference at the 95% confidence level between respondents with planning (n=158) and engineering (n=56) degrees.

* Rate: From "Never" (1) to "Daily" (5)

** Rate: From "Not Enough" (1) to "Too Much" (5)

*** Priority Score = (3.00 - Avg. Rating of Coverage) * Avg. Importance in Job

writing, public speaking, data presentation, working with the public, and writing for the public. In comparison with the results for topics, the results for skills are interesting on two points. First, the average ratings of importance for both groups for these skills as well as others were well over 4, in contrast to the average ratings of importance for topics, which were all below 4. Second, the top five skills were relatively consistent across the two groups, in contrast to the results for topics, in which the top five lists were mostly different. Differences between the two groups in average ratings of the importance of skills were statistically significant for six out of the twenty skills: respondents with engineering degrees rated technical writing, budget preparation, traffic impact analysis, travel demand modeling, facility design, and highway capacity manual software as more important than respondents with planning degrees did. Again, these differences may reflect the correlation between job type and degree type (see Table 3-7).

The share of respondents indicating that the skill was not covered in their degree programs also showed notable differences between the two groups. Over 60% of respondents with engineering degrees reported that working with the public was not covered, compared with only 14.1% of respondents with planning degrees. Nearly 70% of respondents with engineering degrees said that geographic information systems were not covered, compared with 34.0% of respondents with planning degrees. On the other hand, 44.2% of respondents with planning degrees reported that facility design was not covered, compared with only 10.7% of respondents with engineering degrees. For only seven skill areas were the differences in the share of respondents indicated that the skill was not covered statistically significant: data presentation, technical writing, and statistical analysis had low shares for both groups, and Transcad Software had high shares for both groups. In general, the shares of respondents indicating that skills were not covered were considerably lower than the shares indicating that topics were not covered.

The average ratings of coverage of skills were more variable than the average ratings for topics. Again, most ratings were between 2 and 3, but the average ratings for respondents with engineering degrees showed a wider range of ratings, from 3.04 for statistical analysis (indicating coverage somewhat above what is “about right”) to 1.77 for budget preparation. Respondents with planning degrees rated the coverage of all five of their most important topics above 2, although public speaking and working with the public had somewhat lower average ratings at 2.27 and 2.18, respectively. Respondents with engineering degrees, in contrast, rated the coverage of working with the public and writing for the public 1.89. The differences

between the two groups on the average rating of coverage were statistically significant for nine out of the twenty skills: respondents with planning degrees rated coverage higher for working with the public, writing for the public, meeting facilitation, population forecasting compared with respondents with engineering degrees; respondents with engineering rated coverage higher for traffic impact analysis, travel demand modeling, system design, facility design, and highway capacity manual software compared with respondents with planning degrees.

The priorities scores for skills are notable higher than they were for topics for both groups and are higher for respondents with engineering degrees than respondents with planning degrees. The former group had priority scores higher than 4 for working with the public, budget preparation, writing for the public, public speaking, and meeting facilitation, reflecting both the high importance of these skills and the relatively low coverage of these skills in engineering programs. Respondents with planning degrees had priority scores higher than 3 for budget preparation, working with the public, meeting facilitation, public speaking, and writing for the public. Although the priority scores show nearly a point difference between the two groups, the lists are remarkably similar. These results suggest a need for much greater attention to communication skills and management skills in both planning and engineering programs.

Wished-For Courses

When asked what courses were offered that they wished they had taken, respondents with planning degrees most frequently named courses in the category of modeling, simulation, and operation techniques, followed closely by courses in the category of innovative techniques in transportation (Table 3-21). When asked what courses they wished had been offered, respondents with planning degrees most frequently named courses in the category of innovative issues in transportation. In contrast, respondents with engineering degrees most frequently named courses in the categories of innovative techniques in transportation, business/public policy/government/politics, and communication as courses offered that they wished they had taken. This group most frequently named courses in the categories of innovative techniques in transportation, planning practice, and communication as courses they wished had been offered. These results suggest a need for more technical content in planning programs and more emphasis on communication in engineering programs.

Table 3-21 Wished-For Courses: Planning vs. Engineering Degrees

	Planning Master's (n=158)		Engineering Master's (n=56)	
	Wish Had Taken	Wish Had Offered	Wish Had Taken	Wish Had Offered
Courses/Topics List	Count	Count	Count	Count
GIS, Remote Sensing	14	7	2	3
Traffic Engineering, Geometric Design	14	13	2	1
Modeling	10	9	4	4
Transportation Planning	9	17	1	1
Environmental Issues	8	7	1	1
Finance, Budgets	7	3	1	5
Economics, Economic Development	6	2	0	0
Statistics, Survey Methods	4	2	5	0
Land use, Site Design, Real Estate	4	7	2	0
Urban Design, Landscape Architecture	3	2	1	0
Transit Planning	3	8	0	1
Communication	2	8	3	4
Administration, Project Management	2	3	1	4
Law	2	0	0	0
ITS	1	0	2	1
Organizational Behavior	1	2	0	1
Public Involvement	1	4	1	5
Planning Courses or Degree	1	3	1	0
Math	1	0	0	0
Cost-Benefit Analysis	1	2	0	0
Transportation - Land Use Connection	1	4	0	0
Agency Roles	0	1	0	0
Policy Analysis	0	2	1	0
History	0	1	0	0
Ethics	0	1	0	0
Bicycle and Pedestrian Planning	0	6	0	0
Environmental Justice, Other New Topics	0	3	0	0
Other	7	4	4	1
Lots	2	5	1	0
Too Long Ago to Say	4	0	4	1
Degree in Different Field	0	2	0	0
None	2	0	1	3
Number of Respondents Listing...				
One Course	52	58	22	18
Two Courses	17	17	5	6
Three Courses	8	12	2	2

Importance of Sources of Education

Both groups rated personal experience as the most important source of education. Respondents with planning degrees rated informal on-the-job training as next most important, followed by their formal degree program (Table 3-22). Respondents with engineering degrees

rated their formal degree programs as the second more important source of education. Interestingly, the difference between the average ratings of the

importance of their formal degree programs was significant between the two groups, with respondents with engineering degrees rating their degree programs as more important on average than respondents with planning degrees. The former group also rated continuing education programs as significantly more important than the latter group, perhaps reflecting the greater importance of professional licensing in the engineering field.

Table 3-22 Importance of Sources of Education or Training: Planning vs. Engineering Degrees

Sources List	Planning Master's Degree (n=158) Average Assessment*	Engineering Master's Degree (n=56) Average Assessment*
Personal Experience	4.53	4.63
Informal on-the-Job Training from Supervisor/Colleagues	4.29	4.27
Formal Degree Program	3.99	4.34
Professional Workshops	3.60	3.75
Employer-Provided Training	3.28	3.55
Continuing Education Program	2.97	3.40

Note: Highlighting indicates statistically significant differences at the 95% confidence level between respondents with planning and engineering jobs.

* Rate: From "Not at All Important" (1) to "Very Important" (5)

3.5. PROFESSIONAL NEEDS VS. COURSES: RECENT VS. OLDER GRADUATES

Differences between recent graduates and older graduates, defined as those that finished their master's degrees more than ten years ago, might also be interesting. For example, recent graduates and older graduates might indicate different coverage of topics and skills in their programs if programs are in fact evolving in response to the changing demands of transportation planning; in particular, older graduates might report a greater mismatch between job needs and their formal education. In addition, if time since graduation is correlated with position, then recent and older graduates might indicate different levels of importance of topics and skills in their current jobs.

Topics

Contrary to expectations, there were no significant differences between the average ratings of the importance of topics between recent and older graduates. Both groups had the same top five list of topics: regional transportation planning, transportation and land use connection, public involvement, multi-modal integration, and travel demand forecasts (Table 3-23).

The differences between recent and older graduates in the shares of respondents who reported that the topic was not covered in their degree program were interesting. Older graduates were more likely than recent graduates to report that public involvement, bicycle and pedestrian planning, travel demand management, environmental and sustainability issues, transportation control measures, intelligent transportation systems, traffic calming, neighborhood planning, Americans with Disabilities Act, environmental justice, and air quality conformity were not covered in their degree programs. However, notable shares of recent graduates also said that these topics were not covered, and high shares of both groups reported that transit planning, safety, transportation systems management, and goods movement were not covered. These results suggest a lag between the current needs of the respondents and what was provided in their degree programs; whether planning and engineering programs now cover these topics is explored further in Chapter 5.

The average ratings of coverage are mostly between 2 and 3, or something less than "about right." But older respondents rated coverage of six topics below 2, suggesting a significant deficiency on these topics in the past: public involvement, bicycle and pedestrian planning, intelligent transportation systems, Americans with Disabilities Act, environmental justice, and air quality conformity. Recent graduates rated the coverage of most of these topics significantly higher than older graduates did, suggesting that transportation programs have increased their focus on these topics since the passage of ISTEA. The one exception was air quality conformity; recent graduates rated coverage of this topic as low as older graduates did. On two topics, older graduates rated coverage higher than recent graduates: travel demand forecasts and transit planning. These results perhaps reflect a shift in focus in transportation programs from traditional topics to topics emphasized by ISTEA.

Table 3-23 Professional Needs vs. Academic Courses for Topics: Recent vs. Older Graduates

	Average Importance in Jobs*		Not Covered		Average Rating of Coverage**		Priority Score***	
Topics List	Recent Grad.	Older Grad.	Recent Grad.	Older Grad.	Recent Grad.	Older Grad.	Recent Grad.	Older Grad.
Regional Transportation Planning	3.93	3.86	20.1%	12.0%	2.30	2.52	2.74	1.87
Transportation and Land Use Connection	3.76	3.81	10.4%	12.8%	2.46	2.42	2.05	2.22
Public Involvement	3.69	3.75	15.7%	33.6%	2.22	1.93	2.87	4.00
Multi-Modal Integration	3.57	3.37	25.2%	30.0%	2.29	2.35	2.53	2.18
Travel Demand Forecasts	3.30	3.46	32.1%	24.6%	2.16	2.48	2.78	1.80
Transit Planning	3.27	3.29	33.6%	30.5%	2.06	2.32	3.08	2.24
Safety	3.26	3.13	41.8%	45.3%	2.36	2.30	2.10	2.20
Inter-Regional Transportation Planning	3.20	3.14	26.7%	19.3%	2.28	2.37	2.29	1.98
Land-Use Planning	3.10	3.26	5.2%	9.2%	2.75	2.60	0.78	1.30
Bicycle and Pedestrian Planning	3.07	3.05	33.1%	45.4%	2.16	1.92	2.59	3.31
Travel Demand Management	3.00	2.92	32.8%	44.9%	2.25	2.21	2.24	2.32
Environmental and Sustainability Issues	2.89	3.14	13.3%	27.7%	2.44	2.08	1.61	2.90
Transportation System Management	2.88	2.93	39.1%	39.8%	2.34	2.33	1.91	1.96
Law and Regulation	2.82	2.97	7.4%	12.0%	2.71	2.62	0.81	1.12
Professional Ethics	2.70	2.88	13.5%	21.2%	2.84	2.60	0.44	1.15
Transportation Control Measures	2.69	2.78	41.0%	53.0%	2.19	2.17	2.19	2.31
Intelligent Transportation Systems	2.65	2.71	46.7%	72.0%	2.18	1.93	2.18	2.90
Urban Design	2.65	2.83	15.0%	21.0%	2.51	2.55	1.30	1.28
Traffic Calming	2.59	2.67	40.3%	73.7%	2.20	2.04	2.06	2.57
Neighborhood Planning	2.54	2.64	14.2%	27.1%	2.66	2.44	0.87	1.48
Americans with Disabilities Act	2.45	2.50	50.4%	86.7%	2.18	1.92	2.01	2.70
Goods Movement	2.43	2.48	44.8%	36.4%	2.16	2.08	2.03	2.29
Environmental Justice	2.30	2.50	41.8%	69.2%	2.26	1.99	1.70	2.52
Air Quality Conformity	2.23	2.31	56.3%	70.0%	1.97	1.90	2.30	2.55
Transportation History	1.90	1.97	26.9%	23.7%	2.70	2.62	0.56	0.76

Note: Highlighting indicates a statistically significant difference at the 95% confidence level between recent graduates (n=135) and older graduates (n=120) .

* Rate: From "Never" (1) to "Daily" (5)

** Rate: From "Not Enough" (1) to "Too Much" (5)

*** Priority Score = (3.00 - Avg. Rating of Coverage) * Avg. Importance in Job

Older graduates gave the highest priority score, a 4, to public involvement, reflecting both the low rating of coverage and the high rating of importance. The next highest priority for this group was bicycle and pedestrian planning, far behind at 3.3. Environmental and sustainability issues and intelligent transportation systems also received relatively high priority scores from older graduates. In contrast, recent graduates gave the highest priority score to transit planning, followed closely by public involvement, travel demand forecasts, and regional transportation planning. Although attention to public involvement seems to have improved for recent graduates relative to older graduates, both groups clearly see a need for additional attention.

Skills

As was the case for topics, the average ratings of importance for various skills were relatively similar between recent and older graduates (Table 3-24). The top five topics were the same for the two groups, except that older graduates gave writing for the public a significantly higher rating than recent graduates did. Older graduates also gave higher ratings of importance

to budget preparation, environmental impact analysis, system design, and facility design. The higher importance given to budget preparation by older graduates may reflect higher positions within their organizations, but the other differences are harder to explain.

Table 3-24 Professional Needs vs. Academic Courses for Skills: Recent vs. Older Graduates

	Average Importance in Jobs*		Not Covered		Average Rating of Coverage**		Priority Score***	
Skills List	Recent Grad.	Older Grad.	Recent Grad.	Older Grad.	Recent Grad.	Older Grad.	Recent Grad.	Older Grad.
Public Speaking	4.50	4.59	11.1%	24.2%	2.37	2.08	2.82	4.24
Data Presentation	4.47	4.46	3.0%	6.7%	2.86	2.63	0.63	1.66
Working with the Public	4.39	4.50	20.0%	34.2%	2.22	2.10	3.44	4.05
Technical Writing	4.28	4.40	17.2%	14.3%	2.50	2.45	2.16	2.44
Data Collection	4.10	3.93	4.4%	2.5%	2.88	2.80	0.49	0.79
Writing for the Public	4.10	4.42	27.6%	37.6%	2.27	2.14	3.00	3.79
Meeting Facilitation	4.02	4.09	35.8%	54.6%	2.20	2.03	3.22	3.95
Statistical Analysis	3.59	3.43	0.7%	0.8%	2.93	2.91	0.24	0.32
Geographic Information Systems	3.46	3.36	26.7%	70.6%	2.39	1.72	2.13	4.29
Budget Preparation	3.37	3.77	43.0%	41.2%	1.86	1.97	3.84	3.87
Traffic Impact Analysis	3.21	3.38	46.7%	38.7%	2.10	2.30	2.90	2.36
Survey Administration	3.06	2.84	12.6%	18.5%	2.68	2.63	0.97	1.05
Travel Demand Modeling	3.00	3.33	39.6%	27.7%	2.23	2.35	2.30	2.15
Cost-Benefit Analysis	2.98	3.18	4.4%	6.8%	2.44	2.41	1.68	1.89
Environmental Impact Analysis	2.93	3.29	27.4%	29.4%	2.26	2.18	2.17	2.71
System Design	2.81	3.16	51.9%	29.4%	2.26	2.44	2.07	1.76
Population Forecasting	2.74	2.57	18.5%	21.0%	2.66	2.67	0.93	0.84
Facility Design	2.68	3.16	43.7%	32.5%	2.26	2.47	1.99	1.67
Highway Capacity Manual Software	2.60	2.76	61.5%	61.9%	2.19	2.20	2.10	2.20
Transcad Software	1.93	2.02	78.5%	93.2%	1.99	1.98	1.94	2.06

Note: Highlighting indicates a statistically significant difference at the 95% confidence level between recent graduates (n=135) and older graduates (n=120) .

* Rate: From "Never" (1) to "Daily" (5)

** Rate: From "Not Enough" (1) to "Too Much" (5)

*** Priority Score = (3.00 - Avg. Rating of Coverage) * Avg. Importance in Job

The share of respondents indicating that the skill was not covered in their degree programs was mostly consistent between recent and older graduates. Notably higher shares of older graduates said that public speaking, working with the public, and meeting facilitation were not covered, but the difference was most significant for geographic information systems, which 70.6% of older graduates said was not covered in their degree programs. This result is not surprising, given the relatively recent development of GIS. Higher shares of recent graduates said that travel demand modeling and system design were not covered, suggesting that planning programs may have backed away from offering these technical skills. Only three of the skills showed statistically significant differences in the average ratings of coverage: recent graduates

rated coverage of public speaking, data presentation, and geographic information systems higher than older graduates did.

Older graduates gave priority scores of over 4 to three skills: geographic information systems, public speaking, and working with the public. The highest priority scores for recent graduates were for budget preparation, working with the public, meeting facilitation, and writing for the public.

Wished-For Courses

The courses that respondents said they wished they had taken or wished had been offered were similar for recent and older graduates (Table 3-25). Most notably, recent graduates were more likely to say they wish they had taken modeling or that such a class had been offered. This result suggests that although modeling remains important for transportation planners, transportation programs may not be offering a course on this topic as consistently now as they used to.

Sources of Education

Recent and older graduates ranked different sources of education or training in the same order (Table 3-26). Both groups put personal experience first, followed by informal on-the-job-training, followed by their formal degree programs. Recent graduates, however, rated informal on-the-job training as significantly more important than older graduates did. This difference perhaps reflects the apprentice-ship nature of entry-level jobs for new graduates.

Table 3-25 Wished-For Courses: Recent vs. Older Graduates

	Recent Graduates (n=135)		Older Graduates (n=120)	
	Wish Had Taken	Wish Had Offered	Wish Had Taken	Wish Had Offered
Courses/Topics List	Count	Count	Count	Count
Modeling	14	11	2	5
Traffic Engineering, Geometric Design	13	8	5	8
GIS, Remote Sensing	11	5	7	8
Transportation Planning	8	15	3	6
Environmental Issues	7	4	2	6
Land use, Site Design, Real Estate	7	6	0	3
Finance, Budgets	6	4	3	7
Statistics, Survey Methods	5	1	4	1
Planning Courses or Degree	4	3	1	1
ITS	3	1	0	1
Transit Planning	3	9	0	1
Economics, Economic Development	3	1	3	1
Organizational Behavior	2	0	0	3
Urban Design, Landscape Architecture	2	2	2	1
Administration, Project Management	2	4	2	4
Law	2	0	2	3
Public Involvement	1	5	1	6
Communication	1	6	5	6
History	1	0	1	1
Cost-Benefit Analysis	1	0	0	2
Agency Roles	0	1	0	1
Policy Analysis	0	1	2	1
Math	0	0	1	0
Ethics	0	1	1	2
Bicycle and Pedestrian Planning	0	7	0	0
Transportation - Land Use Connection	0	2	1	1
Environmental Justice, Other New Topics	0	2	0	1
Other	9	1	5	5
Lots	1	5	3	1
Too Long Ago to Say	0	1	10	3
Degree in Different Field	1	1	2	2
None	2	1	1	2
Number of Respondents Listing...				
One Course	56	54	41	39
Two Courses	13	15	11	12
Three Courses	9	8	2	10

Table 3-26 Importance of Sources of Education or Training: Recent vs. Older Graduates

Sources List	Recent Graduate (n=135) Average Assessment*	Older Graduate (n=120) Average Assessment*
Personal Experience	4.59	4.51
Informal on-the-Job Training from Supervisor/Colleagues	4.46	4.08
Formal Degree Program	4.06	4.02
Professional Workshops	3.65	3.71
Employer-Provided Training	3.40	3.34
Continuing Education Program	3.05	3.24

Note: Highlighting indicates statistically significant differences at the 95% confidence level between respondents with planning and engineering jobs.

* Rate: From "Not at All Important" (1) to "Very Important" (5)

3.6. ASSESSMENT OF APPLICANTS FOR ENTRY-LEVEL TRANSPORTATION PLANNING JOBS

In addition to asking respondents about the match between their own job needs and educations, the survey asked those respondents involved in hiring decisions for professional transportation planners in the past three years to rate the importance of each topic and skill for entry-level planners and to rate recent applicants on their knowledge and abilities in these areas (both on 5-point scale).

The top five topics in descending order of importance were: transportation and land use connection, regional transportation planning, public involvement, professional ethics, and land-use planning (Table 3-27). The respondents also rated applicants higher on average on their knowledge of these topics than other topics, suggesting satisfaction with applicants in this sense: they are most knowledgeable on the most important topics. However, the average ratings of the knowledge of the applicants were lower than the average ratings of the importance of knowledge for all topics. Although the scales on the two questions do not perfectly match up, this gap may suggest that respondents would like to see applicants with better knowledge of these topics. The five topics with the highest priority scores were travel demand forecasts, transit planning, travel demand management, environmental justice, and public involvement. Interestingly, the priority scores for applicants were often lower than the priority scores for the respondents' own experiences. This result may be an artifact of the differences in the scales used for the questions on course coverage and assessment of applicants, but it may also imply that transportation

Table 3-27 Importance vs. Assessment of Applicants: Topics

Topics List	Average Importance*	Average Assessment**	Priority Score***
Transportation and Land Use Connection	4.00	2.60	1.60
Regional Transportation Planning	3.88	2.60	1.55
Public Involvement	3.74	2.44	2.09
Professional Ethics	3.68	2.79	0.77
Land-Use Planning	3.65	2.83	0.62
Multi-Modal Integration	3.62	2.47	1.92
Travel Demand Forecasts	3.43	2.28	2.47
Inter-Regional Transportation Planning	3.38	2.52	1.62
Transit Planning	3.28	2.25	2.46
Environmental and Sustainability Issues	3.15	2.49	1.61
Law and Regulation	3.14	2.42	1.82
Travel Demand Management	3.08	2.30	2.16
Neighborhood Planning	3.03	2.68	0.97
Urban Design	2.95	2.55	1.33
Bicycle and Pedestrian Planning	2.94	2.54	1.35
Transportation System Management	2.94	2.36	1.88
Intelligent Transportation Systems	2.80	2.37	1.76
Safety	2.79	2.35	1.81
Transportation Control Measures	2.75	2.34	1.82
Traffic Calming	2.66	2.37	1.68
Environmental Justice	2.61	2.18	2.14
Goods Movement	2.50	2.20	2.00
Transportation History	2.40	2.49	1.22
Americans with Disabilities Act	2.22	2.16	1.86
Air Quality Conformity	2.21	2.11	1.97

* Rate: From "Not at All" (1) to "Very" (5)

** Rate: From "Deficient" (1) to "Exemplary" (5)

*** Priority Score = (3.00 - Ave. Assessment) * Ave. Importance in Job

programs are now doing a better job of providing knowledge on important topics than they were in the past.

The top five skills in descending order of importance were technical writing, data presentation, data collection, public speaking, and writing for the public (Table 3-28). The respondents rated the abilities of recent applicants in data presentation and data collection relatively high, but gave applicants only moderate ratings for their skills in public speaking, technical writing, and writing for the public. As was the case for topics, the average ratings of the abilities of the applicants were lower than the average ratings of the importance of abilities for all skills. Although again the scales on the two questions do not perfectly match up, this gap suggests that respondents are dissatisfied with the abilities of applicants in these skills. The respondents rated applicants highest on average for their abilities in Geographic Information

Systems, perhaps reflecting the attention that this skill is now given in transportation planning programs. Priority scores suggest that writing for the public, budget preparation, meeting facilitation, technical writing, and cost-benefit analysis are most in need of attention in transportation programs.

Table 3-28 Importance vs. Assessment of Applicants: Skills

Skills List	Average Importance*	Average Assessment**	Priority Score***
Technical Writing	4.24	2.44	2.37
Data Presentation	4.18	2.74	1.09
Data Collection	4.12	2.86	0.58
Public Speaking	4.10	2.46	2.21
Writing for the Public	4.09	2.25	3.07
Working with the Public	4.02	2.49	2.05
Statistical Analysis	3.85	2.71	1.12
Geographic Information Systems	3.58	2.85	0.54
Meeting Facilitation	3.16	2.22	2.46
Traffic Impact Analysis	3.12	2.42	1.81
Environmental Impact Analysis	3.11	2.43	1.77
Survey Administration	3.09	2.52	1.48
Travel Demand Modeling	3.07	2.25	2.30
Cost-Benefit Analysis	3.04	2.23	2.34
Highway Capacity Manual Software	2.80	2.33	1.88
Population Forecasting	2.77	2.45	1.52
System Design	2.60	2.32	1.77
Budget Preparation	2.54	1.99	2.57
Facility Design	2.54	2.31	1.75
Transcad Software	2.15	2.21	1.70

* Rate: From "Not at All" (1) to "Very" (5)

** Rate: From "Deficient" (1) to "Exemplary" (5)

*** Priority Score = (3.00 - Ave. Assessment) * Ave. Importance in Job

3.7. CONCLUSIONS ON SURVEY ANALYSIS

The survey results suggest that most planning and engineering programs are covering most of the knowledge and skills that transportation planners need at about an adequate level. While that finding could be interpreted as good news for the profession, it also suggests substantial room for improvement. Perhaps the most striking result is the importance of public involvement and communication skills for the respondents and for entry-level planners coupled with the high share of respondents, especially those with masters degrees in engineering, that say that these skills were not covered in their degree programs. On the other hand, respondents with

planning degrees are often missing out on the development of technical skills. The survey results also point to a lag between the skills and knowledge needed by transportation planners today and those they acquired in their degree programs many years earlier. Topics of new importance to the field of transportation planning, including environmental justice, Americans with Disabilities Act, air quality conformity, bicycle and pedestrian planning, environmental and sustainability issues often emerged as high priorities for additional attention in transportation programs.

CHAPTER 4. INTERVIEWS WITH TRANSPORTATION PROFESSIONALS

As another way of exploring the skills and knowledge needed by transportation planners and assessing the degree to which incoming planners have those needed skills and knowledge, we interviewed a small sample of transportation planning professionals. Because of our interest in regional transportation planning, we chose our interviewees from metropolitan planning organizations (MPOs) and asked them about the transportation profession in general as well as the quality of applicants for entry-level positions. This chapter describes the process for selecting interviewees and analyzing their comments and summarizes the results of the interviews. The comments of the interviewees fall into three general categories: changes in needed skills and knowledge since the passage of ISTEA, the fit between entry-level positions and recent graduates, and the importance of experience relative to education for transportation professionals.

4.1 SELECTION OF ORGANIZATIONS AND INTERVIEW METHODOLOGY

The starting point for identifying potential interviewees was a comprehensive list of MPOs located on the Federal Highway Administration (FHWA) website (FHWA 2001). This list, dating from 1994, lists the MPOs from the 50 states (and the District of Columbia) grouped by the nine FHWA regions of the time. One MPO was chosen from each region and so as to represent the full range of agencies by size, from those with fewer than ten employees in small metropolitan areas to those with several hundred employees in large metropolitan areas. We made our initial contact with the selected MPOs mostly by e-mail in order to identify a senior staff member involved with the hiring process for transportation planners. The e-mail message also included a link to a website describing the research project. In all, representatives from ten organizations agreed to be interviewed for this research (Table 4-1).

Eight of the ten interviewees had spent their entire careers in transportation planning with the MPO where they were employed. One had spent 25 years with the MPO but only 3 years in transportation planning. The average time spent at the MPO among the nine remaining subjects was 16.6 years, while the average time in transportation planning was 19.1 years. Eight of the ten interviewees had master's degrees. Major areas of study included communications, planning, civil engineering, public administration and one joint planning and engineering degree. Two of

Table 4-1 Transportation Professionals Interviewed

Professional	Position	Organization
Donald Bubb	Chief of Transportation and Traffic Engineering Section	York County Planning Commision, York, PA
Ann Flemer	Deputy Director of Operations	Metropolitan Transportation Commission, Oakland, CA
George Johnson	Assistant Chief for Land Use, Transportation & Comprehensive Plg	Rhode Island Statewide Planning Council, Providence, RI
Tom Kloster	Transportation Planning Manager	METRO Planning Department, Portland, OR
Rob MacDonald	Transportation Director	Pikes Peak Area Council of Governments, Colorado Springs, CO
Jamsheed Mehta	Chief Planner, Transportation Division	Wichita-Sedgwick Co. Metropolitan Planning Dept, Wichita, KS
Carmine Palombo	Director of Transportation Programs	Southeast Michigan Council of Governments, Detroit, MI
Eugene Ryan	Associate Executive Director	Chicago Area Transportation Study, Chicago, IL
Larry Smith	Director of Planning	Central Mississippi Planning and Development District, Jackson, MS
Loretta Tollefson	Transportation Program Manager	Middle Rio Grande Council of Governments, Albuquerque, NM

the interviewees started in another profession before moving to transportation planning. Eight of the ten interviewees were male.

After providing some background information, interviewees were asked about what transportation planners need to know as far as knowledge areas and skills. Next, interviewees were asked about the qualifications of applicants for entry-level positions, their backgrounds, and how things had changed since the passage of ISTEA. They were then asked about the strengths and weaknesses of planning and engineering programs and the importance of experience for young transportation planners. Finally they were asked if they had any recommendations for transportation educators. All of the questions were open-ended, and interviewees were allowed to speak as extensively as they chose to. The questions used in the interview guide are included in Appendix B.

The interviews were conducted over the phone and lasted from 20 to 45 minutes. The interviewer took notes by hand during the course of the conversation and typed up the notes within one hour of completion of the interview. These notes were analyzed by coding each of

the comments according to nineteen different topics. Eleven of these topics came directly from the interview questions, six others were related to the on-line survey (described in Chapter 3), and two emerged from the interviews themselves. These topics were then grouped into three general themes: the changes in skill and knowledge areas of transportation planners due to ISTEA and TEA-21, the fit between entry-level positions and recent graduates, and the relative importance of experience and education.

4.2 SKILLS AND KNOWLEDGE IN AN ISTEA/TEA-21WORLD

When asked about how skills and knowledge areas had changed since the passage of ISTEA, not every interviewee agreed that there had been changes. The six who did perceive changes highlighted the change in process at the organizational level and the professional elevation of planners as the implementers of that process. Three interviewees were more qualified in their agreement that changes had occurred. One described the change as the direction the profession was going anyway, even before the passage of ISTEA. Another described the changes as a shift in the focus of MPOs. A third interviewee only ascribed "a little" change due to the new legislation. And one interviewee didn't think that ISTEA had produced any changes in the skill areas and knowledge needed by transportation professionals, only new techniques for their use.

The overall change might also be described as a more detailed refinement of the responsibilities of MPOs, including a new emphasis on multiple modes, "the care and feeding of committees," and evaluating impacts on communities. In addition, the overall change includes the ways in which MPOs are required to meet these responsibilities, for example, to provide what one interviewee described as a more "open and transparent" process. An interviewee from a large MPO in the south described how the increased responsibility of MPOs to distribute funds created an opportunity for them to develop a process for allocating funds that all parties could agree was fair. Other new responsibilities for planners generated by ISTEA center on their ability to work with the public to generate and facilitate input, assess different transportation plans, and present results of that analysis to the public. Others described the new factors considered by MPOs in evaluation of projects, including increased emphasis on environmental effects, safety, congestion, and the general acknowledgement that there are other factors related to transportation that impact communities.

The ability to perform these new tasks has led to an increased demand for planners, particularly planners with technical skills. One interviewee summed up the effects of ISTEA as putting planning professionals on a level equal to traffic engineers. Interviewees generally described the shift in approach at MPOs from just engineering to the inclusion of varying degrees of planning. This increased mix in types of employees reflects a major change in how regional transportation planning is conducted today and has contributed to an emphasis on multi-modalism and integration between modes. The need for an ability to perform in this new environment has increased the value of a multi-disciplinary background. Many interviewees expressed a preference for employees with both a planning and an engineering background or what one described as the ability to understand both the policy and technical sides of the work. An inability to find applicants that meet this ideal has forced many agencies to hire people from economics, business, geography, mathematics, and public policy.

The increased value placed on a multi-disciplinary background has also been driven by the increasingly politicized context of this work. Several interviewees described the need for planners to work with elected officials in the course of their work. Working with elected officials means that planners have to conduct themselves in an appropriate manner, generally described as tactful. Planning has become a negotiated process rather than the straight-forward choice of a "highest and best" option. Elected officials may have an agenda different from planners. One interviewee described how elected officials are looking for a silver bullet to solve the problem confronting them – a silver bullet that would come to fruition in a timely manner for the purposes of reelection. Another official described his frustration at having to work in these conditions.

These two main areas of change in transportation agencies, multi-disciplinary emphasis and increased political context, have increased the importance of two main areas of skills for transportation planners today: communication skills and analytical skills. Every professional interviewed mentioned good communication skills as a necessary tool for today's transportation planner. The three main groups of people that planner communicate with are colleagues within their own agency, the public, and elected officials. Many interviewees indicated that these three groups require different types of communication skills, including writing, presentation skills, learning to reduce sophisticated concepts to a one-page memo, personal deportment, conflict management, negotiation skills, and coalition building.

Communication skills complement the second area of concern for those hiring transportation planners, analytical or critical thinking skills. Although "analytical skills" were not specifically mentioned by all of the interviewees, many mentioned skills that can only be described as analytical: interpretation of statistics, thinking clearly, thinking comprehensively, and "looking at numbers and knowing what they mean." One interviewee suggested that in order to acquire these skills, future planners should "read good literature and criticize it."

Interview participants mentioned two other technical areas: data analysis and the interpretation of statistics, and understanding how to evaluate transportation models. The ability to look at numbers and make sense out of them, for planning purposes and in order to explain them to the public, is an essential skill for today's transportation planners. Most interviewees agreed that computer skills in general have increased. But, in addition to a general familiarity with computers, interviewees also mentioned a willingness to learn new software, especially GIS, as a desirable skill.

These areas of change in planning have dictated the knowledge areas and skills now required for transportation planners. Knowledge of how the planning process works was the first topic mentioned by a large portion of the interviewees. Many of them were of the opinion that applicants to their agencies were not aware of the complexities of planning at the regional level. Other relevant knowledge areas cited were zoning, planning, and land use law, spatial (and land use) analysis, what various transportation institutions do and how they interact, basic issues about modeling, and how to read a site plan. Some of these knowledge areas represent essential aspects of transportation planning, most notably, understanding the planning process and transportation planning institutions. Several topics related to land use planning, suggesting a new importance given to the connection between land use and transportation for MPOs. Some of the differences in responses can be explained by differences in the responsibilities of each of the MPOs in the sample, however: the York County Planning Commission, for example, has local planning responsibilities, while the Rhode Island Statewide Planning Council operates at a statewide level.

4.3 THE FIT BETWEEN ENTRY-LEVEL POSITIONS AND RECENT GRADUATES

As one way of assessing the effectiveness of programs in transportation planning or engineering, interview participants were asked about the fit between the knowledge and skills

needed for entry-level positions and the knowledge and skills of recent applicants for these positions. A slim majority of interviewees found recent graduates a good fit for entry-level positions. Three of the ten said they were not finding a good fit, and a fourth described the situation as a lack of good candidates. Members of smaller agencies commented that they had so few staff that employees had to come in ready to work and typically be proficient in several areas, and one interviewee described his agency as too small for specialization. As a result, these smaller MPOs rarely hire a recent graduate.

Desirability of location is also a potential factor affecting the pool of applicants. An interviewee from a large agency in the west said that they had several applicants per position and they were interested in hiring the "best and the brightest" to come in, be trained, and typically stay for a long time. An official from a smaller agency in the midwest expressed frustration at their ability to attract and keep employees and felt that many hires were using employment at their agency to build their resumes and then move on to higher paying positions elsewhere. The fit between job demands and the abilities of applicants may thus vary from MPO to MPO, depending on size and location.

Interview participants noted several strengths that today's entry-level applicants bring to their jobs: a high degree of competence with computers, and an ability to manipulate data. In general, the strengths mentioned by interviewees related to strong technical skills. In addition, several interviewees mentioned enthusiasm. The complementary weakness to the enthusiasm that new hires bring is naiveté. Other weaknesses mentioned by interviewees were also closely related to the inexperience of entry-level personnel. For example, new hires can be impractical; without real-world experience they are unable to assess the appropriateness of solutions. Also, coming right from school where assignments are typically prepared with a correct solution, many new hires have the attitude that all problems can be fixed, "they just have to find the right page of the textbook." Besides these general concerns, several interviewees talked about specific areas where applicants are lacking. Several of the areas mentioned have to do with the nitty-gritty of civic work such as understanding the decision-making process, knowing how to do a subdivision review, and understanding the difference between an ordinance and a resolution. As one interviewee described this situation, "They don't realize that implementing a plan is incremental and slow. If they have no prior experience, then this can be shocking and disillusioning."

4.4 EXPERIENCE VS. EDUCATION

Every single interviewee expressed belief in the value of experience for transportation planners, with the value coming in three main areas. The primary benefit attributed to work experience was the opportunity to understand the "real way" things work. Experience is the only way for transportation planning professionals to learn about working with politicians and the public and to develop an understanding of all of the steps in the decision-making process. Experience also contributes to an understanding of the profession itself. Speaking to the acquisition of experience via the internship one interviewee described experience as a way for a student to "get a feel for the profession" they have chosen. Another way experience helps is in giving planners a better idea of the scope and magnitude of projects and decisions that the entry-level transportation planner is involved in. A second benefit to experience described by interviewees was the opportunity to learn how to apply knowledge acquired in school. This benefit is not unique to transportation planning but is certainly important for any professionally-oriented academic program. The third area of benefit from experience is in building the confidence of the novice transportation planner. These three qualities are all important for today's transportation planners, but they are not often the focus of academic programs and perhaps can only be acquired through job experience or other real-world experience such as internships and well-designed class projects.

Other comments about the value of experience were more closely related to the weaknesses of job candidates described in the previous section. In the context developed here, they could more properly be attributed to weaknesses in the candidates due to improper preparation in the academic setting. Some of this may be attributed to what professionals perceive as the lack of "real world" experience of professors. Many professionals described professors as out of touch with the planning process as it unfolds in reality. When asked for a recommendation for transportation educators, several respondents suggested that they become involved in their local planning community. This experience would then provide them with a background to better prepare graduates. Because of the attributes described above, several subjects said that a high value is placed on an internship when considering hiring entry-level planners.

When hiring entry-level planners, interviewees said they generally placed an emphasis on skill sets rather than the type of a degree held by a candidate. The degrees held by recently hired planners include mathematics, public policy, and social welfare. One interviewee specifically said he prefers a candidate to have a master's in planning and a bachelor's in another subject in order to have diversity within the agency, although he hired a candidate with a liberal arts background who also had extensive experience. Another interviewee specifically stated that experience was more important than a degree in engineering.

The role of engineers in MPOs is dependent on the size of the agency. Interviewees from many of the smaller agencies felt the role of their agency was more about public process while engineering was left to the state department of transportation. The most desirable quality of engineers cited by interviewees was their technical skills; an engineering degree was seen as an assurance of the skills of the candidate. An undesirable aspect of engineers cited by more than one interviewee was their training to produce the "highest and best" solution. Many interviewees felt that the role of their agencies was to provide a variety of solutions to a problem. The narrowness of training and the lack of ability to compromise were seen to at least partially offset the benefits of an engineering degree.

Many interviewees felt that applicants with a planning degree could be expected to have a good exposure to all the necessary aspects of planning. A theoretical background was cited as a good foundation, especially for students to understand how they fit in the big picture. This basic background coupled with technical skills make up a package that is highly desirable to those hiring entry-level transportation planners. A drawback to planners cited by one interviewee was their inability to communicate with the "operational" members of the organization. Several interview participants said they hired more planners than engineers because they were cheaper.

Although interviewees emphasized the benefits of an internship, several were discouraged that local universities did not have a more formal internship program. An official from a large agency on the west coast said that their process for hiring for internships was different than their process for hiring regular positions and that the agency and students would benefit from a more formal relationship. As this interviewee described it, "The missing ingredient is a faculty advocate for interns."

In summary, many of the desirable qualities for transportation professionals are gained mostly from experience, and experience may be more important when applying for jobs than the

type of degree. For one thing, applicants with experience can provide real-world examples in job interviews, giving them an advantage over applicants without. Because of the multi-faceted nature of transportation planning today, many agencies are hiring applicants from a variety of educational backgrounds besides transportation planning or transportation engineering. Some interviewees felt that academic programs are not providing enough candidates, others that academic programs are not adequately preparing the candidates they do produce. As one interviewee pointed out, however, the rapid change in some areas of transportation planning means that learning will always continue on the job: "Travel forecasting is field combat. Solutions come out day-to-day. You just can't institutionalize fast enough."

4.5 CONCLUSIONS

Changes in the practice of transportation planning that have come about since the passage of ISTEA in 1991 have contributed to a change in the kinds of skills and knowledge that MPOs and other agencies look for when hiring for entry-level positions. First, many of the skills that are important for today's transportation planners are not skills that are traditionally imparted through the classroom, particularly skills related to working with people. As a result, agencies place a great value on experience when evaluating applicants for entry-level positions. Second, today's transportation planners require a broad set of skills and knowledge in many different areas. As a result, agencies have come to value a planning degree on par with (or higher than) an engineering degree, and often hire applicants from backgrounds other than planning or engineering, especially if they have experience.

These findings have important implications for academic programs. First, both planning and engineering programs need to explore ways of incorporating training in all important skill and knowledge areas into their curricula. However, some areas are easier and more appropriate for these programs to incorporate than others. Imparting an understanding of the planning process and of transportation planning institutions is an important and achievable goal for these programs, for example. Developing an ability to work well with others is also an important goal, but one that is harder for academic programs to achieve. Second, to ensure that students develop these more subtle skills, planning and engineering programs need to explore ways of giving students opportunities to gain meaningful professional experience. Real-world, team-oriented course assignments and well-managed internships are an obvious approach.

CHAPTER 5. OVERVIEW OF TRANSPORTATION PROGRAMS

In order to characterize the current state of transportation planning education, we undertook an investigation of both the transportation-related training offered by planning programs and the planning-related training offered by transportation programs in engineering, policy and other fields. For planning programs, research was limited to those 66 U.S. schools that offer at least a master's degree in planning, as listed by the Association of Collegiate Schools of Planning (ACSP). For non-planning programs, research was limited to U.S. universities with membership in the Council of University Transportation Centers (CUTC). In each of these 53 universities, transportation-related departments with links to the research center (62 departments in all) were characterized in terms of their planning offerings for graduate students.

The online catalog of degree requirements and course offerings for each school provided a complete and accessible source of data for this analysis. Data on the degrees, concentrations, and transportation planning courses offered by each program was compiled. For planning programs, graduate-level courses with specific transportation content, identified by a tell-tale "transportation" in the title, were included in the database; general skills or methods classes such as statistics or geographic information systems (GIS) were not counted. For the non-planning programs, however, the identification of "planning-related" courses was more challenging. In addition to general transportation planning courses, courses on the following subjects were also included: travel demand forecasting/modeling; environmental impact assessment; transit planning; transportation economics; introductory transportation system management; evaluation, survey and statistical methods in transportation planning; introductory intelligent transportation systems (ITS), and a few others. Courses on the following subjects, usually regarded as transportation engineering, were excluded: traffic control and operations; logistics; advanced transportation systems management; engineering-based computer simulation; traffic and safety; airport/railroad/waterway transport; advanced ITS. Independent study courses or short-term courses for professionals only were also excluded.

In addition to compiling data on degree, concentration, and course offerings, we conducted more detailed analysis for a selected sample of the planning and transportation programs. Eight planning programs offer seven or more transportation courses, while 13

universities offer seven or more planning courses in their transportation-related departments (excluding planning programs). Each of these departments or programs with extensive course offerings was characterized in more detail from online materials and direct contact with the schools when necessary. Both summary statistics and more detailed information on specific schools are presented below. The database compiled for these programs is included in Appendix D.

5.1 TRANSPORTATION-RELATED OFFERINGS IN PLANNING PROGRAMS

Of the 66 U.S. planning programs that offer the master's degree, 24 also offer a Ph.D. degree, and eight offer both of these in addition to a bachelor's degree. Nearly half (32 programs) offer a concentration in transportation planning, and six schools offer joint degree programs in transportation, all of which are in conjunction with departments of civil engineering. On average, planning schools offer 2.6 courses in transportation planning, but a high standard deviation of 2.9 indicates significant variability in the importance planning programs place on transportation planning education. In fact, 19 of 66 planning programs in the U.S. offer no transportation planning courses whatsoever, while only six programs offer more than eight courses in transportation planning.

The most common courses offered, by topic, include: general transportation planning (including urban transportation planning; offered by 31.4% of schools), transportation policy planning (12.2%), transportation and land use/growth management (11.0%), seminar or special topics in transportation (9.9%), and transportation systems planning/analysis (7.0%). Two-thirds of the transportation courses offered to graduate planning students are taught by faculty members within the planning department, while 20% are taught in engineering departments, and 13% in various other departments, including geography and public policy.

In those planning schools that offer the most transportation-related courses, the approach to curriculum can be divided into three types. Some schools, such as the University of Illinois at Chicago and the University of Iowa, administer transportation planning courses and degrees wholly within their planning departments, providing their own courses, taught by their own faculty. Some other schools work within inter-departmental or inter-collegiate arrangements because they lack the faculty or facilities to provide coursework adequate to cover the complex field of transportation. For example, planning students with a transportation planning

concentration at Rutgers University have a chance to take various courses within the school offered by the planning department and the civil and environmental engineering department, and they can also select courses from two other neighboring schools, New Jersey Institute of Technology and Princeton. At the University of California at Berkeley (UC Berkeley), Florida State University, and the University of Minnesota, planning students are encouraged to combine interests in transportation, land use, environment, growth management, and so on by taking courses from other departments in addition to their own offerings. The third type of curriculum approach is exemplified by Massachusetts Institute of Technology (MIT), which offers no concentration in transportation. Transportation-planning students nonetheless have the opportunity to choose from an extensive array of transportation-related courses, ranging from transportation planning, policy, and economics to transportation engineering and advanced system management, through an inter-departmental curriculum. These course offerings are administered by MIT's Center for Transportation Studies (CTS). The planning department at University of California at Irvine (UC Irvine) has a similar system, in cooperation with the Institute of Transportation Studies.

5.2 PLANNING-RELATED OFFERINGS IN TRANSPORTATION PROGRAMS

Among the 62 non-planning programs affiliated with CUTC, 45 are housed in engineering departments, typically civil or civil and environmental engineering. One tenth are housed in interdisciplinary departments of transportation studies or transportation science, and another tenth are housed in public policy. Of these transportation-related programs, 93.5% offer the master's degree, and 69.4% offer both master's and Ph.D. degrees. Four of the CUTC universities offer a joint degree engineering and either planning (UC Berkeley, University of Nebraska at Lincoln, and Georgia Tech) or public policy (University of Texas at Austin (UT Austin)). Programs typically offer an average of 3.8 planning-related courses, but there is significant variability, as 15 programs offer none or only one such course.

The transportation planning courses most common in non-planning programs are generally similar to those most frequently offered in planning programs: 27.2% of the CUTC members offer general transportation planning, 11.9% offer transportation systems analysis/planning, and 8.9% offer transportation policy planning. However, it is much more common for the non-planning schools to offer transportation finance/economics (12.3%,

compared to 5.2% for planning schools) and public transportation/transit (11.4%, compared to 5.8% for planning schools). The majority of these courses (75.8%) are taught by civil engineering faculty members, roughly matching the general participation of civil engineering programs in CUTC.

Thirteen schools offering more than seven planning-related transportation courses were analyzed in more detail. Among them, four offer more than ten graduate courses: The City College of New York (CCNY), UC Berkeley, UC Irvine and UT Austin. UC Irvine has the most varied and extensive offerings, as its Institute for Transportation Studies is sponsored by several units: Department of Civil and Environmental Engineering, Department of Economics, School of Social Sciences, and School of Social Ecology. CCNY also provides a wide variety of courses for transportation planning students, with offerings in various fields such as economics, asset management, systems, environmental issues, demand forecasting, policy, and evaluation. Both UC Berkeley and UT Austin have joint degree programs in transportation, with the Department of City and Regional Planning (M.S./M.C.P.) and School of Public Affairs (M.S./M.P.A.), respectively.

It appears that several civil engineering departments are giving transportation students the opportunity to take in-house planning-related courses when they are not available from the planning department or when a planning department does not exist. For example, civil engineering departments at the Georgia Institute of Technology (Georgia Tech), University of Massachusetts Amherst, Virginia Polytechnic Institute and State University, and the University of Virginia offer many transportation planning-related courses in addition to their standard transportation engineering courses. At several other universities, departments other than civil engineering and planning provide significant degree and course offerings for graduate students. As an example, George Mason University's School of Public Policy has a master's program in Transportation Policy, Operations, and Logistics.

Most notably, some schools have been developing interdisciplinary graduate programs, administered by the university transportation research center, which sometimes even offers its own graduate professional degrees or certificates in transportation. The New Jersey Institute of Technology has an interdisciplinary program in transportation; students in Northwestern University's Transportation Center study with various faculty members in engineering, management, and economics; MIT's Center for Transportation Studies links six departments and

provides the interdepartmental Ph.D. program in transportation as well as an M.S. in Transportation (M.S.T.). The University of California at Davis offers a PhD and an M.S. in Transportation Technology and Policy, an interdisciplinary program administered by the Institute of Transportation Studies that involves faculty from several different departments across campus.

5.3 URBAN TRANSPORTATION PLANNING COURSES

Most transportation planning courses have broad titles that give only a general indication of the kinds of knowledge and skills they cover. A more detailed understanding of the knowledge and skills imparted to students requires an analysis of the content of courses, including the range of topics and the nature of the assignments. To keep the scale of the analysis manageable, we focused in this study on courses titled "urban transportation planning." When possible syllabi for these courses were downloaded from the Internet. Otherwise, the instructors of the courses were asked via an email request to send copies of their syllabi. Seventeen transportation courses (from seventeen universities) with some combination of "urban," "transportation," and "planning" in their titles were included in the analysis (Table 5-1). Among the seventeen courses, eight were offered by planning programs, seven were offered by civil engineering departments, and two by other types of programs. Textbooks used and topics covered in these courses were catalogued based on the information provided in the syllabi. However, the variation in detail in the syllabi presented a significant challenge in this analysis.

Reading assignments help to define the content of a course. Eleven courses had required books and five courses provided course packets prepared by instructors (Table 5-2); two courses had a required text and a course packet. At least eight courses used reserved readings as one of supporting materials, and one course used all three types of readings. The syllabi generally did not indicate whether additional readings were distributed in class. Of the required books, the text by Meyer and Miller (2001) is used most frequently, in five of the seventeen courses. This text, written by engineers, includes a balance of technical material related to travel demand and supply analysis, and material related to transportation policy and the planning process. Three of these five courses were engineering courses and two were planning courses. The text on urban transportation geography by Hanson (1995), which also includes material on planning and policy as well as travel demand analysis, was used in only two courses, one a cross-listed course between planning and engineering and one a regional studies course. Several other texts, more

focused on planning processes or history, were used in two courses each. These findings suggest little standardization of the definition of the field of urban transportation planning.

The content of courses was analyzed by the number of class hours devoted to different topics. Course topics were grouped into 36 different categories based on the description of the topic in the syllabi (Table 5-3). The results of this analysis also suggest little standardization

Table 5-1 Urban Transportation Planning Courses

	School	Department	Course Title
1	City University of New York	Civil Engineering	Urban Transportation Planning
2	Georgia Mason University	Civil, Environmental, & Infrastructure Engineering	Urban Transportation Planning
3	Minnesota State University	Urban & Regional Studies Institute	Urban Transportation Planning
4	Morgan State University	Transportation	Advanced Urban Transportation Planning
5	North Carolina State University	Civil Engineering	Urban Transportation Planning & Modeling
6	Portland State University	Urban Studies & Planning	Urban Transportation Planning
7	San Jose State University	Urban Transportation Planning	Introduction to Transportation & Urban Planning
8	University of Alabama - Birmingham	Civil Engineering	Urban & Transportation Planning
9	University of Alabama - Huntsville	Civil Engineering	Urban Transportation Planning
10	University of Illinois - Chicago	Urban Planning & Public Affairs	Urban Transportation Planning I: Introduction
11	University of Illinois - Urbana Champaign	Urban & Regional Planning	Urban Transportation Planning
12	University of Nebraska	Civil Engineering	Urban Transportation Planning
13	University of North Carolina - Chapel Hill	City & Regional Planning	Urban Transportation Planning
14	University of Oklahoma	Urban Planning	Urban & Regional Transportation Planning
15	University of Southern California	Policy, Planning, & Development	Urban Transportation Planning & Management
16	University of Texas - Austin	Community & Regional Planning	Urban Transportation Planning
17	Wayne State University	Civil Engineering	Urban Transportation Planning

Table 5-2 Books Required in Urban Transportation Planning Courses

Title of Text	Author(s)	Number of Courses
Urban Transportation Planning	Meyer & Miller, 2001	5
Transportation Planning on Trial	Garrett & Wachs, 1996	2
Transportation Systems and Service Policy	Schoon, 1996	2
Urban Transportation Planning in the US	Weiner, 1999	2
Geography of Urban Transportation	Hanson, 1995	2
Metropolitan Transportation Planning	Dickey, 1983	1
Stuck in Traffic	Downs, 1992	1
Sustainibility & Cities	Newman & Kenworthy, 1999	1
The Power Broker	Caro, 1974	1
Transportation for Livable Cities	Vuchic, 1999	1
Travel Demand Forecasting Processes	ITE, 1994	1

of the definition of the field of urban transportation planning and little agreement on the skills and knowledge in this field that are most important to impart to students. The topic most consistently covered is an overview of urban transportation planning, including some exposure to history. All seventeen courses covered this topic, although the amount of time devoted to the topic ranged from 1.5 course hours (one class period) to nine course hours. Travel forecasting modeling was covered in 15 out of the 17 courses, but the amount of time devoted to the topic ranged from 3 hours (two class periods) to 24 hours. Seven courses spent over 15 hours on forecasting models, accounting for just less than one-half up to nearly three-fourths of the entire course. Four of the heavy-modeling courses were taught in engineering, but two were taught in planning, and one in another type of program. On average, courses devoted 13.7 hours to the topic, equivalent to about 9 class sessions or 4.5 weeks, more than any other topic. No other topics were covered in more than 10 courses, and only 10 topics were covered in more than five courses. That leaves twenty-six topics that were covered in five or fewer courses, at least according to the syllabi. It is possible that some courses cover additional topics implicitly, as a part of the topics listed in the syllabus.

Some of the variation in the coverage of topics can be explained by the number of transportation courses a program is able to offer. If a program offers only one or two transportation planning courses, the urban transportation planning course is likely to cover a broad range of topics. If a program can offer several transportation planning courses, then an urban transportation planning course might provide more depth on specific topics. Some

programs offer more than one course labeled "urban transportation planning." For example, the University of Illinois at Chicago provides four specific courses that might fall into this category: "Urban Transportation Planning I: Introduction" and "Urban Transportation Planning 3:Laboratory" offered by the College of Urban Planning and Public Affairs; and "Urban Travel Forecasting" and "Urban Transportation" offered by the Department of Civil and Materials Engineering. In addition, some of the topics covered by urban transportation planning courses in some programs are covered in other courses in other programs. The diversity of content in urban transportation planning courses mirrors the diversity of courses found in transportation planning programs.

5.4 CONCLUSIONS

What the research in this chapter most clearly shows is that there is no standard or uniform approach to transportation planning education, within either planning schools or non-planning transportation programs. The number of transportation planning courses offered and the content of such courses are highly variable. Non-planning programs (the majority of which are engineering programs) offer 3.8 transportation planning courses on average, while planning programs offer 2.6 on average, but some programs offer two or three times as many transportation planning courses. Several of the leading transportation education programs offer potential models of interdisciplinary curricula, but none has yet established a standard for the field. A more detailed analysis of the content of transportation planning courses guided by the survey results described below, to be completed in the subsequent phase of this study, should offer more insights into the range of topics covered and the depth of coverage of each topic in these programs.

Table 5-3 Summary of Topics in Urban Transportation Planning Courses

No	Topic	Course Number *																	No. of Courses	Total Hours	Hrs / Course
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17			
1	Overview (+ History)	9	3	3	3	1.5	1.5	4.5	3	6	3	3	3	3	4.5	3	1.5	3	17	58.5	3.4
2	Street Classification System																		0	0.0	-
3	Transit			9				4.5	4.5		3	3	1.5			3	1.5	3	9	33.0	3.7
4	Travel Forecasting Modeling		18		21	21	9	6	10.5	30	3	24	13.5	6	3	18	4.5	18	15	205.5	13.7
5	Non-Motorized	3									3		1.5				1.5		4	9.0	2.3
6	Institutional and Stakeholder Issues	3						1.5			3			3	3		4.5		6	18.0	3.0
7	Freight	3	3					3											3	9.0	3.0
8	Travel Characteristics		3	3			3		3					3					5	15.0	3.0
9	Livable Communities	9		3															2	12.0	6.0
10	Case Studies																		0	0.0	-
11	Data		3			1.5	3	1.5					3						5	12.0	2.4
12	Air Quality		3	1.5		3					3	1.5				3	1.5		7	16.5	2.4
13	Project/Alternatives Evaluation		3				1.5		3			3	3				1.5	3	7	18.0	2.6
14	Traffic Impact Analysis			1.5				3		6		1.5		3		1.5			6	16.5	2.8
15	Transportation Demand Management (TDM)			3				6			3				1.5	3			5	16.5	3.3
16	Intermodal Planning														3				1	3.0	3.0
17	Regional Policy/Solutions			3								3		3					3	9.0	3.0
18	Financing and Economics							1.5			6						1.5		3	9.0	3.0
19	Land Use Planning/Development Process					1.5		1.5								3			3	6.0	2.0
20	Equity					3											1.5		2	4.5	2.3
21	Implementation		3				1.5		1.5								3		4	9.0	2.3
22	Transportation and Land Use Interaction			3				1.5			3			3	1.5		1.5		6	13.5	2.3
23	Regional Problems							3				3		3			3		4	12.0	3.0
24	Highway Capacity and Level Of Service							4.5									1.5		2	6.0	3.0
25	Highway Options							3							1.5			3	3	7.5	2.5
26	Environmental Impacts							1.5						1.5	1.5	3	3		5	10.5	2.1
27	International Transportation Planning							1.5											1	1.5	1.5
28	Planning Process/Decision Making						1.5		4.5				3	1.5		3	4.5		6	18.0	3.0
29	Land Use Models				3	3													2	6.0	3.0
30	System Analysis		3	3			9		13.5				6	6	3				7	43.5	6.2
31	Context/Politics				3									3					2	6.0	3.0
32	Neighborhood Issues																1.5		1	1.5	1.5
33	Intelligent Transportation System (ITS)/Technology										3			3			1.5	3	4	10.5	2.6
34	Communication					3											1.5		2	4.5	2.3
35	Geographic Information System (GIS)					3							1.5						2	4.5	2.3
36	Benefits and Goals																	1.5	1	1.5	1.5
37	Corridor Planning														1.5				1	1.5	1.5
38	Transportation Data Management Systems				3							3							2	6.0	3.0
	Number of Topics	5	9	10	5	9	8	16	8	3	10	9	9	13	10	9	18	7			
	Total Hours	27	42	33	33	40.5	30	48	43.5	42	33	45	36	42	24	40.5	40.5	34.5			

* See Table 5-1 for list of courses by number.

CHAPTER 6. INTERVIEWS WITH TRANSPORTATION EDUCATORS

As another way of characterizing and understanding the curricula of transportation programs, we interviewed a small sample of transportation educators. We choose educators from both planning and engineering programs and asked them about the strengths and weaknesses of their own programs and about trends in transportation education more generally. This chapter describes the process for selecting interviewees and analyzing their comments and summarizes the results of the interviews. The comments of the interviewees fall into three interrelated categories: planning versus engineering programs, providing needed skills and knowledge, and changes in transportation planning education.

6.1 SELECTION OF EDUCATORS AND INTERVIEW METHODOLOGY

We created an initial list of potential faculty to interview based on personal connections and the list of programs identified in Chapter 5. After repeated attempts to reach all faculty members on the list, we completed a total of six interviews, three in each type of program (Table 6-1). Using an interview guide, we asked these educators about the strengths and weaknesses of their own programs as well as general trends in transportation education (Appendix C). All interviews were conducted over the phone, and notes were taken by hand. Twenty-seven codes were used to analyze the interview notes. Sixteen codes were directly based on the questions in the interview guide, with four highlighting specific skills or knowledge areas mentioned by interview subjects, five were related to the academic perspective specifically, and the last six captured other noteworthy points from the interviews.

6.2 PLANNING VS. ENGINEERING PROGRAMS

As might be expected, the goals of engineering and planning departments with respect to the profession of transportation planning are fundamentally different. Goals for engineering programs focus on “tools” and “technology” and emphasize the teaching of a skill set, including analytical skills as well as specific tools. The goals of planning programs, as described by interviewees, are more related to “process” and “policy” than specific tools. A planning professor neatly summed up the difference between planning and engineering: “Planning is [about] long range planning and policy issues, funding, environmental, and political issues

Table 6-1 Transportation Educators Interviewed

Faculty Member	University	Program
Alan Black	Univ. of Kansas	Planning
Jonathan Levine	Univ. of Michigan	Planning
Scott Rutherford	Univ. of Washington	Engineering
Kumares Sinha	Purdue University	Engineering
Marty Wachs	Univ. of California Berkeley	Planning
Michael Walton	University of Texas	Engineering

[while] engineering is a practice in which construction, and design and operations of transportation facilities is more prominent." However, the programs also share common goals, and educators from both fields recognize the importance of "a blending of the two professions," as one educator described it, or "that intermediate area between the technical strengths of engineering and the policy side of planning," as another described it.

Interviewees were asked about what actions were being taken to bridge the divide between engineering and planning programs. The challenge is to provide planning students with more technical skills, such as modeling, and engineering students with skills in politics and communication. One general approach to meeting this challenge is to change the content or style of teaching within the program. For example, a planning educator attempts to introduce planning and engineering students to each other's field by promoting collaborative projects between the students on class projects. Another planning educator said that he "emphasizes an accessibility-based transportation curriculum – that is the core of an urbanist transportation approach, and it defines the distinctive element of our program"; this approach creates a new lens for both planners and engineers to observe and evaluate their chosen profession. An engineering educator described the general shift in his department from design to modeling and analytical tools.

Another approach is to make use of courses taught in the other program. As noted by one interviewee, it is first necessary to have active transportation programs in both planning and engineering. Only one interviewee said that planning students were required to take a certain number of engineering classes and vice versa, although it is encouraged in several other programs. An engineering educator said his program requires one core course that covers planning topics such as transportation policy, project evaluation, and financing. Other recommendations for increasing contact between programs included the cross-listing of courses

in planning and engineering and the offering of a joint degree. However, programs that do have strong interdepartmental ties attribute those ties to the work of an individual professor, rather than to permanent institutional arrangements.

Complicating these efforts is the tendency for applicants to choose planning or engineering because of their assessment of their own abilities, as one engineering educator noted. Those better at math and science go into engineering and those better at policy and communication skills go into planning. Another engineering educator suggested that it would be appropriate for transportation engineering programs to specifically recruit students with good people skills. Indeed, the type of students entering engineering programs may be changing. He observed that in the recent past the majority of the transportation engineering students in his program were women, who generally have better communication skills than the male students in the program.

The interviewees generally did not indicate that bridging the divide between planning and engineering is a top administrative priority, however. As one professor noted, "it's more important to articulate what urban planning brings to transportation than bridge the divide." Another professor said, "This is not one of the things [we're] mainly focusing on, so [we're] not doing it adequately." This seems to sum up the experience for most of the interviewees. Few could offer concrete examples at their own institutions and instead referred to well-known programs at MIT, Northwestern, UC Berkeley, and Georgia Tech, or at previous institutions where they had worked. As an example of a university that successfully embodies an integrated transportation program, both planning and engineering educators mentioned MIT.

In addition, several interviewees also expressed concern about efforts to bridge planning and engineering. A planning educator expressed concern that transportation planning maintains respect as a separate field with a unique perspective: we "don't want planning to be pale engineering." At the same time, an engineering educator expressed concern that the profession is losing its hard science aspect. He called for an increase in academic rigor for the discipline: "Everybody does transportation research now – that implies that you don't need rigorous training in theoretical underpinnings. The transportation field has gotten itself diffused. It is not hard-core, science-based anymore." The implication is that educators need to effectively combine elements of both programs while also preserving their traditional boundaries.

6.3 PROVIDING NEEDED SKILLS AND KNOWLEDGE

Providing the skills and knowledge that transportation planning professionals need is not always easy for planning and engineering programs. For one thing, not all programs in either field emphasize the training of transportation professionals. Three educators made note of the distinction between universities that have Ph.D. programs and those that don't. Universities offering Ph.D. programs were described as being more research-oriented and also concentrating resources on Ph.D. students, "because we found that they are around longer, so you get something back." Universities offering only master's programs were described as being oriented towards preparing students for professional practice. These comments highlight the tension between academia and practice. While both planning and engineering educators say that they are preparing students for professional practice, there is often a divide between academia and the professional world. One educator described, for example, how professionals would like to see students learn specific software programs in school, while academic programs prefer to educate students about the theory and methods built into software programs. In addition, the profession is continually changing and academic programs cannot always keep up. Some of the areas where academia lags behind practice that were specifically mentioned by interviewees included writing, analysis of ethical dilemmas, professional practice, and professional development. In order to stay more in touch with the professional realm one engineering program has set up an external advisory group for the their department. Professionals offer critical feedback to which the department tries to respond.

Although planning and engineering educators say they are able to provide their students with a wide range of skills, some of the most important skills are especially challenging to provide. Comments about important skill areas fell into two main categories: communication skills and analytical skills. Most of the planning and engineering educators mentioned the need for students to have good communication skills but also described various levels of difficulty in including communication components (such as presentations) in their courses. Problems mentioned included the shyness of students and the time away from lecture hours due to oral presentations. One engineering educator described the crux of the matter for them,

> *We need to turn out people who are better at providing information in a way decision-makers can understand and use. A lot of our students cannot translate technical information into terms policymakers can use in their work – and don't think they need to.*

Planning and engineering educators described the need for analytical skills in different ways. Two of the engineering educators focused on the need for skills in statistical analysis. One of the planning educators specifically mentioned the importance of teaching students to think critically. He discussed the need for students to understand modeling, economic analyses, and other professional skills and the equally importantly need to understand the limits of these techniques. With this understanding, students learn to ask the right questions. Another planning educator had a slightly different take on the matter: "[t]he ability to blend technical expertise with political wisdom, insight, and people-organizational skills is very important." As a third planning educator said, "a good transportation practitioner needs to have some of the dimensions of an engineer and some of the dimensions of a planner." However, he noted, the appropriate mixture of these qualities may be beyond the scope of universities and its acquisition by students may have to come from job experience.

Opinions about how best to address the need for job experience as a way of developing professional skills varied. Only one engineering educator mentioned an internship program and its benefits to the students. This program provides free tuition to students who participate in the internship program. One planning educator suggested that the best way for students to become prepared for a job is to go back and forth between working and going to school so they can reflect on what they have learned. However, the relationships between academia and practice are not always good. The engineering educator described how the academic program and the private sector expect different things from each other and expressed concern that private businesses are gaining from the internship program without reciprocating, for example, by donating to the fund that pays for the internships.

6.4 CHANGES IN TRANSPORTATION PLANNING EDUCATION

Educators from both planning and engineering programs discussed the ways their programs have changed in the past decade. One engineering educator described a dramatic change in their program from "hard-core design and operations of highways to a broader, multi-modal program," reflecting the changes in transportation practice triggered by ISTEA and TEA-21. Another engineering educator described an increased emphasis on preparing students for practice by encouraging internships. This program also offers credit for experience and changed

the requirement for a research paper to allow memos accompanying examples of work as a substitute. One planning educator described an increase in computing, modeling, data manipulation, theory, and statistics but stated that the change was not enough. The other programs, however, have changed in response to the loss of faculty members or changes in the interests of the faculty members. The third engineering educator described a decrease in the number of planning courses offered and a general "streamlining" of courses, largely due to a shift in the interest of the faculty members. A second planning educator described how the character of the transportation program is dependent on the faculty members and their interests. His transportation program, for example, has moved away from an emphasis on Intelligent Transportation Systems (ITS) towards a more critical perspective. The third planning educator described a program in transition due to the loss of a transportation professor and a low priority given to finding a replacement. Thus, program changes do not always reflect conscious efforts to implement improvements.

Although the educators typically described their own programs in glowing terms, they also discussed specific strengths and weaknesses. Engineering educators generally described the strength of their programs in terms of the number of applicants and the quality of the jobs their graduates land. Planning educators were more likely to mention the diversity of skills and knowledge areas provided to students, including simulation, optimization, traffic calming, and street design. Self-described weaknesses covered a wide range of topics. In general, in discussing their weaknesses, the planning educators concentrated their remarks on specific elements within their programs. Two educators were particularly concerned about social-political-equity issues. One specifically criticized engineering programs for their lack of inclusion of a human dimension in their curricula but also said that planning programs were "not responsive to a wide range of social issues such as equity and analysis of environmental impacts." Similarly, another educator said that there needs to be a better connection between the technical and political aspects of the profession so that students are better prepared to deal with the political environment that they may be working in. Other areas of concern related to the definition of the field. One educator said that the land use-transportation connection is inadequately covered by most programs. Another educator argued for an increased focus on accessibility rather than mobility in transportation planning education.

The comments of two of the educators suggest that research funding may be having a negative impact on the direction of transportation programs. An engineering educator suggested that one reason for the lack of rigor in transportation programs is related to the funds available for transportation research. In their eagerness to have access to these funds, he theorized, some universities may be operating programs that are not as strong as they could be. A planning educator suggested that the transportation bureaucracy directs research into less innovative alternatives than might be otherwise pursued. Whether the fault lies with the bureaucracy or the programs themselves – or both – the result may be a decline in rigor and innovation in research as well as teaching.

One of the keys to improving transportation planning education is clearly multidisciplinary efforts. Every educator interviewed commented on both the benefits of multidisciplinary studies and agreed that more formalized multidisciplinary components would strengthen their programs. Some programs require that students take a course outside the home department in such areas as public policy, financing, statistics, systems analysis, public administration, and politics. However, these educators recognize that this requirement falls short of a true interdisciplinary program that effectively integrates a variety of disciplines. However, interdisciplinary programs have been difficult to establish and maintain. All the educators who discussed successful interdisciplinary relationships with other departments cited the efforts of a specific professor to make it happen. Once that professor left, the ties fell apart and the departments lost contact. Faculty departures and continuing vacancies have made any efforts to improve transportation programs difficult. Another problem is a lack of recognition at the university level for multidisciplinary work. One engineering educator suggested that encouragement or a requirement for an interdisciplinary approach from funding agencies, such as the U.S. Department of Transportation or state departments of transportation, could ensure the development of such programs.

6.5 CONCLUSIONS

Although the general consensus is that both planning and engineering programs are successfully providing a wide range of skills and knowledge to their students, most educators stress the need for more attention to both communication and analytical skills and to the achievement of an effective blend of planning and engineering skills. Establishing

interdisciplinary programs to provide transportation students with the skills and knowledge they need to be effective professionals is not easy. Although both planning and engineering educators recognize the importance of such efforts, they have run into significant obstacles in their own attempts to improve transportation education. Some of these obstacles are administrative (e.g. delays in filling an open position, insufficient resources to help students find employment), while others are systemic to academia (e.g. lack of recognition for multidisciplinary work). In addition, the pace of change in the profession of transportation planning points to a need for regular reassessments of the curricula in planning and engineering programs, as well as efforts to provide students with professional experience as a part of their education.

CHAPTER 7. OUTLOOK OF TODAY'S TRANSPORTATION PLANNERS

In the rapidly changing climate of transportation planning, notions of the most pressing problems, appropriate planning techniques, and effective solutions can vary widely. Ideas about transportation planning developed when a practicing planner was in school twenty years ago may be largely obsolete. Planners acquire new ideas through their professional experience, from planning journals, and by attending transportation conferences. In order to assess current attitudes among today's transportation planning professionals, we included a series of attitudinal questions in the on-line survey described in Chapter 3. Respondents were asked to indicate whether they agreed or disagreed with 25 statements about transportation problems, planning processes, and possible solutions. The statements were designed to emphasize key federal policies, particularly the requirements of TEA-21.

The results were analyzed for the overall sample and by type of job, type of degree, and time since graduation. If academic training influences attitudes, then significant differences should be seen between respondents with planning degrees and those with engineering degrees. If professional experience influences attitudes, then significant differences should be seen between respondents with planning jobs and those with engineering jobs. At the same time, professional experience might reduce the significance of the difference between recent graduates and older graduates. The results show greater differences by type of degree than by type of job or time since graduation.

7.1 OVERALL SAMPLE

The two statements with the highest average level of agreement echo the findings on other parts of the survey: "Public input improves the transportation planning process" and "Additional land use regulations are needed to address future mobility needs" both had average scores of over 4 (Table 7-1). The agreement with the latter statement is consistent with the importance respondents gave to the relationship between land use and transportation in other parts of the survey. The agreement on the benefits of public input is also consistent with the importance respondents gave to public involvement in other parts of the survey. The statement, however, suggests not just that public involvement is important, but that it actually improves

Table 7-1 Views Regarding Current Issues in Transportation Planning

List of Statements	All Respondents (n=360) Average Agreement*
Public input improves the transportation planning process.	4.09
Additional land use regulations are needed to address future mobility needs.	4.05
ISTEA has improved the quality of transportation planning.	3.89
Future transportation projects should focus on increasing person capacity rather than vehicle capacity.	3.92
Future transportation projects should focus on increasing the efficiency of the existing transportation system.	3.96
People will participate in the planning process only when they feel a direct threat.	3.95
Sustainability should be the primary goal in long-range transportation plans.	3.69
Environmental Impact Statements (EIS) have an important impact on the selection of transportation alternatives.	3.58
A planning degree is excellent preparation for the job duties of a transportation planner.	3.37
The private automobile will still dominate transportation in metropolitan areas in fifty years.	3.55
Technology-based solutions are more feasible than solutions that depend upon behavioral changes.	3.21
Current public involvement programs provide meaningful opportunities for public input into transportation decisions.*	3.07
Environmental Impact Statements (EIS) have been an effective means for identifying and mitigating of the environmental impacts of transportation	3.00
The transportation planning process usually leads to the selection of the best alternative.	2.91
The Clean Air Act Amendments have been an effective tool for improving air quality in metropolitan areas.	2.89
Metropolitan Planning Organizations have enough autonomy in the selection of local transportation projects.	2.76
Current practices for addressing environmental justice are sufficient.	2.69
The transportation models in use today do a good job of predicting future transportation system needs.	2.60
The tools available to transportation planners today are adequate to meet the planning challenges of the future.	2.53
TEA-21 provides enough funding flexibility for local areas to address their transportation needs.	2.42
Transportation policies should not require people to change their behavior or lifestyle.	2.27
Current Corporate Average Fuel Efficiency (CAFÉ) standards are sufficient to address fuel supply issues.	2.02
If not for monetary constraints it would be possible to meet the mobility needs of the next 20 years with roadway construction.	1.64
The needs of people who are dependent upon non-motorized modes are adequately addressed by current transportation policies.	1.63
The needs of non-drivers are adequately addressed by current transportation policies.	1.55

* Rate: From "Disagree" (1) to "Agree" (5)

the process. This result seems at least somewhat at odds with the frustration with dealing with the public that many respondents expressed.

The results suggest that transportation planners largely agree with and support the goals of ISTEA and TEA-21. Besides agreeing with public involvement and land use regulations, respondents agreed with a focus on increasing efficiency, person capacity rather than vehicle capacity, and sustainability. Respondents agree that ISTEA has improved the quality of transportation planning and they seem to have faith in the planning process, including environmental impact statements, practices for addressing environmental justice, and travel demand modeling. But while respondents agreed on the effectiveness of these techniques, they did not agree strongly, suggesting some room for improvement. The statements on which the average scores show significant disagreement on the part of respondents point to support for stronger policies on certain issues, including corporate average fuel efficiency standards and the needs of non-drivers.

Several statements help to define the philosophy of the respondents towards solutions to transportation problem. Besides agreeing with a focus on increasing efficiency, person capacity rather than vehicle capacity, and sustainability, as noted above, respondents expressed only moderate agreement that "technology-based solutions are more feasible than solutions that depend upon behavioral changes" and, at the same time, expressed moderate disagreement that "transportation policies should not require people to change their behavior or lifestyle." These results suggest that respondents put more faith in technological solutions but also believe that behavioral solutions are appropriate. While indicating strong support for more efforts for non-drivers, respondents agreed that "the private automobile will still dominate transportation in metropolitan areas in fifty years."

7.2 PLANNING VERSUS ENGINEERING JOB

The differences in average scores between respondents with planning jobs and those with engineering jobs were statistically significant on only four statements (Table 7-2). First, respondents with engineering jobs agreed more strongly on average that "People will participate in the planning process only when they feel a direct threat." This difference perhaps reflects a difference in professional experience, where engineers are less likely to be involved throughout the public involvement process and more likely to interact with the public on specific projects

rather than more general – and less controversial – plans. Second, respondents with planning jobs agreed more strongly on average that "ISTEA has improved the quality of transportation planning." This result may reflect the greater involvement of planners in the planning process rather than a fundamental difference of perspectives on ISTEA. Third, respondents with engineering jobs agreed more strongly on average that "The private automobile will still dominate transportation in metropolitan areas in fifty years." This result may reflect somewhat more optimism on the part of planners that efforts to improve and promote alternatives to driving will be successful. Fourth, respondents with engineering jobs agreed more strongly on average that "Current public involvement programs provide meaningful opportunities for public input into transportation decisions." This result suggests that respondents in planning jobs see a greater need for improvements in public involvement and that those in engineering jobs are more likely to feel that current efforts are sufficient.

7.3 PLANNING VS. ENGINEERING DEGREE

The differences in average scores between respondents with planning jobs and those with engineering jobs were statistically significant on seven statements (Table 7-3). Significant differences were also seen on two of these statements between respondents with planning jobs and those with engineering jobs, but five statements did not show significant differences by job type. Not surprisingly, respondents with planning degrees agreed more strongly on average that "A planning degree is excellent preparation for the job duties of a transportation planner." Respondents with engineering degrees also agreed with this statement, however. Also not surprisingly, respondents with engineering degrees agreed more strongly on average that "Technology-based solutions are more feasible than solutions that depend upon behavioral changes. This result may reflect a natural correlation between the kinds of people who believe in technology and those who choose engineering professions as well as a focus on technological solutions in engineering programs. Respondents with planning degrees agreed more strongly that "The Clean Air Act Amendments have been an effective tool for improving air quality in metropolitan areas." Respondents with engineering degrees were roughly neutral on this statement, agreeing only slightly on average. Positions were reversed on whether "Current practices for addressing environmental justice are sufficient": respondents with engineering

Table 7-2 Views Regarding Current Issues in Transportation Planning: Planning vs. Engineering Job

Statements List	Plan. Job (n=237) Average Agreement*	Eng. Job (n=39) Average Agreement*
Public input improves the transportation planning process.	4.14	3.97
Additional land use regulations are needed to address future mobility needs.	4.09	3.84
ISTEA has improved the quality of transportation planning.	4.03	3.40
Future transportation projects should focus on increasing person capacity rather than vehicle capacity.	3.98	3.68
Future transportation projects should focus on increasing the efficiency of the existing transportation system.	3.96	4.00
People will participate in the planning process only when they feel a direct threat.	3.83	4.19
Sustainability should be the primary goal in long-range transportation plans.	3.74	3.78
Environmental Impact Statements (EIS) have an important impact on the selection of transportation alternatives.	3.63	3.74
A planning degree is excellent preparation for the job duties of a transportation planner.	3.42	3.19
The private automobile will still dominate transportation in metropolitan areas in fifty years.	3.41	3.89
Technology-based solutions are more feasible than solutions that depend upon behavioral changes.	3.13	3.53
Current public involvement programs provide meaningful opportunities for public input into transportation decisions.	3.07	3.53
Environmental Impact Statements (EIS) have been an effective means for identifying and mitigating of the environmental	3.00	3.35
The transportation planning process usually leads to the selection of the best alternative.	2.93	2.97
The Clean Air Act Amendments have been an effective tool for improving air quality in metropolitan areas.	2.92	2.78
Metropolitan Planning Organizations have enough autonomy in the selection of local transportation projects.	2.81	2.51
Current practices for addressing environmental justice are sufficient.	2.65	2.94
The transportation models in use today do a good job of predicting future transportation system needs.	2.63	2.97
The tools available to transportation planners today are adequate to meet the planning challenges of the future.	2.58	2.59
TEA-21 provides enough funding flexibility for local areas to address their transportation needs.	2.47	2.22
Transportation policies should not require people to change their behavior or lifestyle.	2.21	2.30
Current Corporate Average Fuel Efficiency (CAFÉ) standards are sufficient to address fuel supply issues.	2.05	2.16
If not for monetary constraints it would be possible to meet the mobility needs of the next 20 years with roadway construction.	1.62	1.95
The needs of people who are dependent upon non-motorized modes are adequately addressed by current transportation	1.62	1.94
The needs of non-drivers are adequately addressed by current transportation policies.	1.58	1.59

Note: shading indicates statistically significant differences at the 95% confidence level.

* Rate: From "Disagree" (1) to "Agree" (5)

Table 7-3 Views Regarding Current Issues in Transportation Planning: Planning vs. Engineering Degree

Statements List	Plan. Master's Degree (n=158) Average Agreement**	Eng. Master's Degree (n=56) Average Agreement**
Additional land use regulations are needed to address future mobility needs.	4.20	3.82
Public input improves the transportation planning process.	4.17	4.12
ISTEA has improved the quality of transportation planning.	4.05	3.73
Future transportation projects should focus on increasing person capacity rather than vehicle capacity.	3.99	3.76
Future transportation projects should focus on increasing the efficiency of the existing transportation system.	3.97	4.04
People will participate in the planning process only when they feel a direct threat.	3.87	4.08
Sustainability should be the primary goal in long-range transportation plans.	3.86	3.53
Environmental Impact Statements (EIS) have an important impact on the selection of transportation alternatives.	3.54	3.83
A planning degree is excellent preparation for the job duties of a transportation planner.	3.53	3.00
The private automobile will still dominate transportation in metropolitan areas in fifty years.	3.50	3.96
Technology-based solutions are more feasible than solutions that depend upon behavioral changes.	3.14	3.73
The Clean Air Act Amendments have been an effective tool for improving air quality in metropolitan areas.	3.03	2.58
Environmental Impact Statements (EIS) have been an effective means for identifying and mitigating of the environmental	2.92	3.12
Current public involvement programs provide meaningful opportunities for public input into transportation decisions.	2.86	3.49
The transportation planning process usually leads to the selection of the best alternative.	2.80	2.96
Metropolitan Planning Organizations have enough autonomy in the selection of local transportation projects.	2.65	2.71
The tools available to transportation planners today are adequate to meet the planning challenges of the future.	2.54	2.50
Current practices for addressing environmental justice are sufficient.	2.53	2.94
TEA-21 provides enough funding flexibility for local areas to address their transportation needs.	2.48	2.58
The transportation models in use today do a good job of predicting future transportation system needs.	2.46	2.82
Transportation policies should not require people to change their behavior or lifestyle.	2.13	2.54
Current Corporate Average Fuel Efficiency (CAFÉ) standards are sufficient to address fuel supply issues.	1.91	1.88
The needs of people who are dependent upon non-motorized modes are adequately addressed by current transportation	1.50	2.00
If not for monetary constraints it would be possible to meet the mobility needs of the next 20 years with roadway construction.	1.48	1.82
The needs of non-drivers are adequately addressed by current transportation policies.	1.45	1.86

Note: shading indicates statistically significant differences at the 95% confidence level.

* Rate: From "Disagree" (1) to "Agree" (5)

degrees agreed more strongly than respondents with planning degrees, perhaps suggesting higher standards on the part of the latter group for how the environmental justice requirement is met or reflecting more hands-on experience with trying to meet the requirement. Finally, neither group agreed that "The needs of people who are dependent upon non-motorized modes are adequately addressed by current transportation policies," although respondents with engineering degrees disagreed less than those with planning degrees.

7.4 RECENT VS. OLDER GRADUATE

The differences in average scores between recent graduates and older graduates were statistically significant on only two statements (Table 7-4). The similarities in views between these groups tend to support the hypothesis that professional experience may help to erase any differences in attitudes built into academic programs in different eras of planning. Recent graduates agreed more strongly than older graduates that "ISTEA has improved the quality of transportation planning." This difference may reflect an emphasis on ISTEA principles in academic programs in the last ten years, or perhaps a slight resistance on the part of older graduates to the changes that ISTEA brought about. Neither group agreed that "The needs of non-drivers are adequately addressed by current transportation policies," although older graduates disagreed less on average, perhaps reflecting at least some difference in priorities among the two groups.

7.5 PRESSING ISSUES AND PROMISING SOLUTIONS

As another way of assessing the current attitudes and perspectives of transportation planners, we asked the survey respondents to pick a single most critical issue in transportation planning (Table 7-5). Overall, respondents overwhelmingly chose sprawl and congestion as the most critical issues; these two issues accounted for nearly 70% of all responses. The variations by type of job, type of degree, and time since graduation are interesting, however. Respondents with planning jobs were slightly more likely to name sprawl as the most critical issue rather than congestion (38% to 31%), while respondents with engineering jobs were twice as likely to name congestion as the most critical issue rather than sprawl (49% to 24%). This difference may reflect the correlation between job type and degree type and differences in the emphases of

Table 7-4 Views Regarding Current Issues in Transportation Planning: Recent vs. Older Graduates

Statements List	Recent Graduates (n=135) Average Agreement**	Older Graduates (n=120) Average Agreement**
Additional land use regulations are needed to address future mobility needs.	4.22	4.01
ISTEA has improved the quality of transportation planning.	4.17	3.72
Public input improves the transportation planning process.	4.06	4.12
People will participate in the planning process only when they feel a direct threat.	4.05	3.80
Future transportation projects should focus on increasing the efficiency of the existing transportation system.	3.99	3.94
Future transportation projects should focus on increasing person capacity rather than vehicle capacity.	3.90	3.98
Sustainability should be the primary goal in long-range transportation plans.	3.86	3.59
The private automobile will still dominate transportation in metropolitan areas in fifty years.	3.54	3.71
Environmental Impact Statements (EIS) have an important impact on the selection of transportation alternatives.	3.54	3.60
A planning degree is excellent preparation for the job duties of a transportation planner.	3.42	3.39
Technology-based solutions are more feasible than solutions that depend upon behavioral changes.	3.29	3.10
Environmental Impact Statements (EIS) have been an effective means for identifying and mitigating of the environmental	3.02	2.89
Current public involvement programs provide meaningful opportunities for public input into transportation decisions.	3.02	2.99
The Clean Air Act Amendments have been an effective tool for improving air quality in metropolitan areas.	2.94	2.84
The transportation planning process usually leads to the selection of the best alternative.	2.82	2.83
Metropolitan Planning Organizations have enough autonomy in the selection of local transportation projects.	2.67	2.76
Current practices for addressing environmental justice are sufficient.	2.57	2.69
The transportation models in use today do a good job of predicting future transportation system needs.	2.53	2.48
The tools available to transportation planners today are adequate to meet the planning challenges of the future.	2.47	2.51
TEA-21 provides enough funding flexibility for local areas to address their transportation needs.	2.42	2.50
Transportation policies should not require people to change their behavior or lifestyle.	2.20	2.38
Current Corporate Average Fuel Efficiency (CAFÉ) standards are sufficient to address fuel supply issues.	1.99	1.83
The needs of people who are dependent upon non-motorized modes are adequately addressed by current transportation	1.53	1.74
If not for monetary constraints it would be possible to meet the mobility needs of the next 20 years with roadway construction.	1.51	1.68
The needs of non-drivers are adequately addressed by current transportation policies.	1.43	1.70

Note: shading indicates statistically significant differences at the 95% confidence level.

* Rate: From "Disagree" (1) to "Agree" (5)

Table 7-5 Most Critical Issue in Transportation Planning

Issue	All Respondents (n=338) Percent	Plan. Job (n=237) Percent	Eng. Job (n=39) Percent	Plan. Degree (n=158) Percent	Eng. Degree (n=56) Percent	Recent Grad. (n=135) Percent	Older Grad. (n=120) Percent
Sprawl	35%	38%	24%	42%	26%	42%	29%
Congestion	34%	31%	49%	24%	50%	32%	31%
Equity of Service	4%	4%	5%	5%	4%	3%	6%
Energy Consumption	4%	4%	3%	4%	4%	5%	5%
Global Warming	3%	3%	0%	5%	0%	2%	5%
Equity of Impacts	3%	2%	0%	3%	0%	2%	4%
Safety	3%	3%	3%	3%	4%	3%	2%
Air Quality	2%	2%	5%	3%	0%	2%	3%
Other	12%	14%	11%	11%	12%	9%	15%
Total	100%	100%	100%	100%	100%	100%	100%

planning and engineering programs. Indeed, the differences for respondents with planning degrees and those with engineering degrees are even greater, with 42% of those with planning degrees naming sprawl as the most critical issue and 50% of those with engineering degrees naming congestion as the most critical issue. The differences for recent graduates and older graduates are also interesting. While 74% of recent graduates named sprawl or congestion as the most critical issue, only 60% of older graduates named either of these issues. The views of older graduates on this question were more varied than for any of the other subgroups. This finding may reflect the greater work experience of this group and the influence of this experience on their views about critical issues.

In addition, we asked respondents to select a single most promising solution to the most critical problem (Table 7-6). Interestingly, land use policies emerged as the most frequently named solution for the overall sample and for every subgroup. This result may be an artifact of the list of solutions provided, which offered only one general category of land use strategies but included several different transportation strategies. But for respondents with planning jobs, respondents with planning degrees, and recent graduates, at least half named land use policies at the most promising strategy, out polling all transportation strategies combined. It's possible that these respondents see land use policies as a more comprehensive approach, addressing a wider range of issues, than the transportation strategies, which tend to address more specific issues. Not surprisingly, respondents with engineering degrees named Intelligent Transportation Systems (ITS) and road/highway expansion more frequently than other groups, at 16% and 10%, respectively.

Table 7-6 Most Promising Solution in Transportation Planning

Solution	All Respondents (n=325)	Plan. Job (n=237)	Eng. Job (n=39)	Plan. Degree (n=158)	Eng. Degree (n=56)	Recent Grad. (n=135)	Older Grad. (n=120)
	Percent	Percent	Percent	Percent	Percent	Percent	Percent
Land Use Policies	46%	51%	31%	53%	34%	50%	44%
Transit Improvements	14%	12%	22%	18%	8%	16%	12%
Intelligent Transportation Systems	7%	7%	11%	3%	16%	7%	5%
New Vehicle and/or Fuel Technology	6%	6%	6%	6%	8%	4%	9%
Roadway and/or Parking Price Controls	6%	4%	8%	4%	8%	6%	8%
Improvements for Non-Motorized Modes	3%	4%	3%	3%	0%	2%	1%
Road/Highway Expansion	3%	2%	8%	0%	10%	2%	3%
Other	15%	14%	11%	14%	16%	13%	18%
Total	100%	100%	100%	100%	100%	100%	100%

CHAPTER 8. ANALYSIS AND RECOMMENDATIONS

The literature review, the survey of professionals, the curriculum analysis, and interviews with selected professionals and educators together point to several important and interrelated issues that transportation educators must resolve. The following comments are a synthesis of critiques and recommendations from all of these sources.

Communication Skills

The importance of communication skills is emphasized by just about everyone, researchers, professionals, and educators alike. This set of skills includes writing, data presentation, public speaking, and interpersonal relations. The challenge for transportation educators is to find effective ways of improving the communication skills of their students. Giving students practice in writing reports for the public or making presentations at public meetings is a start, but students also need more formal training to fully develop these skills.

Educator-Professional Link

The lag between the changing transportation planning context and the content of transportation planning curricula suggests a need for strong and respectful links between the professionals and educators. Many such links currently exist: professional planners serve on the accreditation teams for planning programs, educators work with professionals on consulting projects, and so on. Yet formal mechanisms for feedback from professionals to educators on the content of their curricula may be too rare.

Theory-Practice Tension

A related issue is an age-old tension between the teaching of theory and the teaching of practice. Professionals often fail to see the importance of the theory they learned as students. Students are often anxious to acquire the skills that they believe will help them land a good job. Educators often find it difficult to teach theory in ways that convince the students of its importance and incite their interest in the material. Yet theory helps transportation planners understand the phenomena they work with and the inherent subjectivity of the work they do, and

it helps prepare them for taking on new challenges as the field of transportation planning evolves. Theory thus provides them with another important tool for doing good work.

Critical Thinking

Teaching transportation planning students to think critically is another important challenge for transportation educators. Transportation planners must understand both the strengths and limitations of the tools and techniques they use. They must be able to identify the different perspectives from which a problem can be defined or a solution evaluated. They must be able to acknowledge how their own attitudes and experiences influence the work that they do. They must be trained to question their work and the work of others in constructive ways. To meet this challenge, educators must think critically about their own work, in particular, the style of their teaching.

Political Context

An ability to work in an increasingly politicized climate is another requirement for today's transportation planner. Good communication skills, shared insights from experienced planners, a knowledge of planning theory, and critical thinking skills all contribute to this ability. Giving students a taste of the political realities of transportation planning and the kinds of compromises necessary for completing projects is another important challenge for transportation educators and demands creativity in the design of courses and class exercises.

Multi-Disciplinary Connections

Just about everyone also argues for the importance of multi-disciplinary connections to meet these challenges. Many programs appear to have made at least some of these connections, if only motivated by necessity rather than pedagogy, although these connections often depend on personal contacts and individual commitment. A few programs appear to have made these connections in a meaningful way, ensuring an education balanced between traditional technical skills and the "softer" kinds of skills demanded of today's transportation planners. The experiences of these programs may provide important guidance for the others on how to create an effective multi-disciplinary transportation planning program.

These findings point to a need for changes in planning and engineering programs to better prepare graduates for careers in or related to transportation planning. Curricular changes must include not just the topics and skills covered but also the ways in which students are trained and educated inside and outside the classroom. Of course, there's a limit to what academic programs can provide to their students, and on-the-job experience will always be an important source of training and education as well. But planning and engineering programs can almost certainly do a better job of preparing their graduates for the messy and evolving reality of transportation planning. Curricular improvements can help to improve the effectiveness and efficiency of transportation planning practice, impacting our communities in positive ways. Curricular improvements can also help to increase the value of a degree in transportation, whether offered by a planning, engineering, or multidisciplinary program, thereby benefiting both the programs and their graduates. To effect these changes, academic programs will need help from the transportation planning profession and from their own institutions and they will need to overcome their own inertia. The challenges may be daunting, but the potential payoff is promising.

APPENDIX A: TEXT VERSION OF ON-LINE SURVEY OF PROFESSIONALS

Welcome to the Transportation Education Survey

Funded by the
Southwest Region University Transportation Center

This survey is an important part of a study on the education of transportation planning professionals. The study is being funded by the Southwest Region University Transportation Center and is being directed by Dr. Susan Handy of the University of Texas at Austin. Your participation in this survey is critical to the success of this study. The survey should take about 15 minutes to complete. Once you begin filling out this survey there is no opportunity to save it and return to complete it. Please be sure you have the allotted time available to complete it in one session. Be assured that all your responses will be completely confidential; the survey database will not include your name or any other form of identification. Please contact Dr. Handy at handy@mail.utexas.edu if you have any questions about the survey or the study.

Thanks for your contribution to this important research!

If you are not familiar with on-line surveys, here are a few tips.

Questions with circle response buttons will accept only one correct answer. If you feel you have chosen an incorrect response, clicking on another button in the list will change your response.

Questions with square response buttons will allow you to choose as many responses as you feel necessary. If you feel you have chosen an incorrect response, clicking on the button again will remove your mark.

1) In five words or less, what is the most challenging aspect of your job?

Please tell us about where you work

2) How would you characterize the organization where you work?

- Federal Department of Transportation
- Other federal department: please specify below
- State Department of Transportation
- Other state department: please specify below
- Metropolitan planning organization
- Other regional planning agency: please specify below
- City planning department
- City public works department
- Other city department: please specify below
- Transit agency
- Private consulting firm
- Other private organization: please specify below
- Non-profit organization: please specify below
- Other (please specify)

If you selected other please specify:

3) Approximately how many people are employed at your organization?

1 - 10
11 - 50
51 - 100
101 - 1000
1000+

4) In what state is your office located?
Click on the arrow to choose from the list of states.

5) What is your current title or classification?

6) How long have you been in the transportation field (years)?

7) How long have you been in your current position (years)?

8) Which of these duties does your current position include? Please check all that apply.

Develop long range plans
Assess environmental impacts of transportation projects
Assess community impacts of transportation projects
Analyze project alternatives
Prioritize projects
Analyze and develop policy
Develop neighborhood plans
Conduct public involvement
Other (please specify)

If you selected other please specify:

9) What share of your job would you describe as "planning"?

No Planning Some Planning Mostly Planning All Planning
Please check one

10) What share of your job would you describe as "engineering"?

No Engineering Some Engineering Mostly Engineering All Engineering
Please check one

Please tell us about the skills involved in performing your job

11) How frequently does your job address the following topics?
Please rate from "Never" (1) to "Daily" (5).

Air quality conformity
Americans with Disabilities Act
Bicycle and pedestrian planning
Environmental and sustainability issues
Environmental justice
Goods movement
Intelligent Transportation Systems
Inter-regional transportation planning
Land use planning
Law and regulation

Multi-modal integration
Neighborhood planning
Professional ethics

12) How frequently does your job address the following topics (continued)?

Public Involvement
Regional transportation planning
Safety
Traffic calming
Transit planning
Transportation and land use connection
Transportation Control Measures
Transportation history
Transportation System Management
Travel demand forecasts
Travel Demand Management
Urban design

13) Other key topics for your job:

14) How important are the following SKILLS in performing your job?
Please rate from "Not Important" (1) to "Very Important" (5).

Budget preparation
Cost-benefit analysis
Data collection
Data presentation
Environmental impact analysis
Facility design
Geographic Information Systems
Highway Capacity Manual software
Meeting facilitation
Population forecasting

15) How important are the following SKILLS in performing your job (continued)?

Public speaking
Statistical analysis
Survey administration
System design
Technical writing
Traffic impact analysis
Transcad software
Travel demand modeling
Working with the public
Writing for the public

16) Other skills important to your job:

Please tell us about your education

17) Please choose the option that describes your educational background and then click on the bar to continue.

High School is highest formal degree
Associates is the next highest degree earned
Bachelors is the next highest degree earned

18) Associates Degree
College or university where degree was received:
Area of study:
Year completed:

19) Please choose the option that describes your educational background and click on the bar to continue.
Associates degree is highest degree
Bachelors is the next highest degree earned

20) Bachelors Degree
College or university where degree was received:
Area of study:
Year completed:

21) Please choose the option that describes your educational background and then click on the bar to continue.
Bachelors is highest degree
Masters is the next highest degree earned

22) Masters Degree
College or university where degree was received:
Area of study:
Year completed:

23) Please choose the option that describes your educational background and click on the bar to continue.
Masters is highest degree
Ph.D is the next highest degree earned

24) Ph.D
College or university where degree was received:
Area of study:
Year completed:

25) What professional accreditations do you hold?
American Institute of Certified Planners
Professional Engineer
None at this time
Other (please specify)

If you selected other please specify:

26) How important have the following sources of education or training been for providing you with skills and knowledge that are most useful for your current job?
Please rate from "Not at all" (1) to "Very" (5).

Formal degree program
Continuing education program
Professional workshops
Employer-provided training
Informal on-the-job training from supervisor/colleagues
Personal experience
Other: Please specify

Additional comments:

27) To what extent did you cover the following SUBJECT AREAS in your degree program? (Not covered, Minor portion of course, Major portion of course, or Full course)

Air quality conformity
Americans with Disabilities Act
Bicycle and pedestrian planning
Environmental and sustainability issues
Environmental justice
Goods movement
Intelligent Transportation Systems
Inter-regional transportation planning
Land use planning
Law and regulation
Multi-modal integration
Neighborhood planning
Professional ethics

28) To what extent did you cover the following SUBJECT AREAS in your degree program (continued)?

Public Involvement
Regional transportation planning
Safety
Traffic calming
Transit planning
Transportation and land use connection
Transportation Control Measures
Transportation history
Transportation System Management
Travel demand forecasts
Travel Demand Management
Urban design

29) To what extent did you cover the following SKILLS in your degree program? (Not covered, Minor portion of course, Major portion of course, or Full course)

Budget preparation
Cost-benefit analysis
Data collection
Data presentation
Environmental impact analysis
Facility design
Geographic Information Systems

Highway Capacity Manual software
Meeting facilitation
Population forecasting

30) To what extent did you cover the following SKILLS in your degree program (continued)?

Public speaking
Statistical analysis
Survey administration
System design
Technical writing
Traffic impact analysis
Transcad software
Travel demand modeling
Working with the public
Writing for the public

31) Given the skills and knowledge important in you current position, do you think you received the right amount of exposure to the following SUBJECT AREAS in your formal degree program?
Please rate from "Not enough" (1) to "Too much" (5)?

Air quality conformity
Americans with Disabilities Act
Bicycle and pedestrian planning
Environmental and sustainability issues
Environmental justice
Goods movement
Intelligent Transportation Systems
Inter-regional transportation planning
Land use planning
Law and regulation
Multi-modal integration
Neighborhood planning
Professional ethics

32) Given the skills and knowledge important in your current position, do you think you received the right amount of exposure to the following SUBJECT AREAS in your formal degree program (continued)?

Public Involvement
Regional transportation planning
Safety
Traffic calming
Transit planning
Transportation and land use connection
Transportation Control Measures
Transportation history
Transportation System Management
Travel demand forecasts
Travel Demand Management
Urban design

33) Given the skills and knowledge important in you current position, do you think you received the right amount of exposure to the following SKILL AREAS in your formal degree program? Too much? Not enough?

Budget preparation
Cost-benefit analysis
Data collection
Data presentation
Environmental impact analysis
Facility design
Geographic Information Systems
Highway Capacity Manual software
Meeting facilitation
Population forecasting

34) Given the skills and knowledge important in you current position, do you think you received the right amount of exposure to the following SKILL AREAS in your formal degree program (continued)?

Public speaking
Statistical analysis
Survey administration
System design
Technical writing
Traffic impact analysis
Transcad software
Travel demand modeling
Working with the public
Writing for the public

35) What classes did you not take that you wish you had taken?

36) What classes do you wish you had been offered but weren't?

Please tell us about your experience in the hiring of transportation professionals

37) Have you been involved in hiring decisions for professional planners in the past three years? After answering click on the grey bar to continue.

Yes
No

38) How many hiring decisions have you been involved with during the last three years regarding a transportation planning professional?

39) When hiring ENTRY-LEVEL planners, how important do you feel knowledge in the following SUBJECT AREAS is?
Please rate from "Not at all" (1) to "Very" (5).

Air quality conformity
Americans with Disabilities Act
Bicycle and pedestrian planning
Environmental and sustainability issues
Environmental justice

Goods movement
Intelligent Transportation Systems
Inter-regional transportation planning
Land use planning
Law and regulation
Multi-modal integration
Neighborhood planning
Professional ethics

40) When hiring ENTRY-LEVEL planners, how important do you feel knowledge in the following SUBJECT AREAS is (continued)?

Public Involvement
Regional transportation planning
Safety
Traffic calming
Transit planning
Transportation and land use connection
Transportation Control Measures
Transportation history
Transportation System Management
Travel demand forecasts
Travel Demand Management
Urban design

41) When hiring ENTRY-LEVEL planners, how important do you feel ability in the following SKILL AREAS is?
Please rate from "Not at all" (1) to "Very" (5).

Budget preparation
Cost-benefit analysis
Data collection
Data presentation
Environmental impact analysis
Facility design
Geographic Information Systems
Highway Capacity Manual software
Meeting facilitation
Population forecasting

42) When hiring ENTRY-LEVEL planners, how important do you feel ability in the following SKILL AREAS is (continued)?

Public speaking
Statistical analysis
Survey administration
System design
Technical writing
Traffic impact analysis
Transcad software
Travel demand modeling
Working with the public
Writing for the public

43) Are there other importants skills and knowledge areas that you are looking for in entry-level applicants?

44) How would you rate recent applicants for ENTRY-LEVEL positions on their knowledge in these SUBJECT AREAS?
Please rate from "Deficient" (1) to "Exemplary" (5).

Air quality conformity
Americans with Disabilities Act
Bicycle and pedestrian planning
Environmental and sustainability issues
Environmental justice
Goods movement
Intelligent Transportation Systems
Inter-regional transportation planning
Land use planning
Law and regulation
Multi-modal integration
Neighborhood planning
Professional ethics

45) How would you rate recent applicants for ENTRY-LEVEL positions on their knowledge in these SUBJECT AREAS (continued)?

Public Involvement
Regional transportation planning
Safety
Traffic calming
Transit planning
Transportation and land use connection
Transportation Control Measures
Transportation history
Transportation System Management
Travel demand forecasts
Travel Demand Management
Urban design

46) How would you rate recent applicants for ENTRY-LEVEL positions on their ability in these SKILL AREAS?
Please rate from "Deficient" (1) to "Exemplary" (5).

Budget preparation
Cost-benefit analysis
Data collection
Data presentation
Environmental impact analysis
Facility design
Geographic Information Systems
Highway Capacity Manual software
Meeting facilitation
Population forecasting

47) How would you rate recent applicants for ENTRY-LEVEL positions on their ability in these SKILL AREAS (continued)?

Public speaking
Statistical analysis
Survey administration

System design
Technical writing
Traffic impact analysis
Transcad software
Travel demand modeling
Working with the public
Writing for the public

48) What do you see as the biggest strengths in entry-level applicants?

49) What do you see as the biggest weaknesses in entry-level applicants?

50) Are you finding a sufficient number of qualified applicants for your entry-level positions?
Yes
No

Please tell us about yourself

51) What is your age (years)?
Under 18
18 - 24
25 - 34
35 - 44
45 - 54
55 - 64
65 or older

52) What is your gender?
Male
Female

53) What is your racial or ethnic background?

rather not say
Caucasian/White
African american
Indigenous or Aboriginal Person
Asian/Pacific Islander
Hispanic
Latino
Mutiracial

54) What professional organizations do you belong to?

American Planning Association
Institute of Transportation Engineers
Transportation Research Board
ITS America
Other (please specify)

If you selected other please specify:

55) What professional listserves do you subscribe to?

56) What professional magazines and newsletters do you read regularly?

We would like to know a little bit about your views regarding current issues in transportation planning

57) Read the following statements and indicate to what extent you agree or disagree with each.
Please rate from "Disagree" (1) to "Agree" (5).

1. A planning degree is excellent preparation for the job duties of a transportation planner.
2. If not for monetary constraints it would be possible to meet the mobility needs of the next 20 years with roadway construction.
3. The needs of non-drivers are adequately addressed by current transportation policies.
4. Future transportation projects should focus on increasing person capacity rather than vehicle capacity.
5. The tools available to transportation planners today are adequate to meet the planning challenges of the future.
6. TEA-21 provides enough funding flexibility for local areas to address their transportation needs.
7. The Clean Air Act Amendments have been an effective tool for improving air quality in metropolitan areas.
8. Current Corporate Average Fuel Efficiency (CAFÉ) standards are sufficient to address fuel supply issues.
9. Environmental Impact Statements (EIS) have been an effective means for identifying and mitigating of the environmental impacts of transportation alternatives.
10. Additional land use regulations are needed to address future mobility needs.
11. Metropolitan Planning Organizations have enough autonomy in the selection of local transportation projects.
12. Public input improves the transportation planning process.
13. Transportation policies should not require people to change their behavior or lifestyle.

58) Read the following statements and indicate to what extent you agree or disagree with each (continued).

14. The transportation planning process usually leads to the selection of the best alternative.
15. Future transportation projects should focus on increasing the efficiency of the existing transportation system.
16. The needs of people who are dependent upon non-motorized modes are adequately addressed by current transportation policies.
17. Sustainability should be the primary goal in long-range transportation plans.
18. Current public involvement programs provide meaningful opportunities for public input into transportation decisions.
19. Technology-based solutions are more feasible than solutions that depend upon behavioral changes.
20. The transportation models in use today do a good job of predicting future transportation system needs.
21. People will participate in the planning process only when they

feel a direct threat.
22. Current practices for addressing environmental justice are sufficient.
23. The private automobile will still dominate transportation in metropolitan areas in fifty years.
24. ISTEA has improved the quality of transportation planning.
25. Environmental Impact Statements (EIS) have an important impact on the selection of transportation alternatives.

59) What do you see as the MOST critical issue in transportation planning today? Please check one.

Air quality
Congestion
Energy consumption
Equity of impacts
Equity of service
Global warming
Safety
Sprawl
Other (please specify)

If you selected other please specify:

60) What do you see as the MOST promising solution for addressing the problem you checked above? Please check one.

Intelligent Transportation Systems
Improvements for non-motorized modes
Land use policies
New vehicle and/or fuel technology
Road/highway expansion
Roadway and/or parking price controls
Transit improvements
Other (please specify)

If you selected other please specify:

61) How did we contact you to participate in this survey?

Email to APA Transportation Planning Division members
E-mail to ITE Planning Council members
E-mail to Transportation Futures Network
I don't know
Other (please specify)

If you selected other please specify:

62) Please provide additional comments for us about your educational and professional experiences. If you would like to participate in the interview phase of this research, please provide your name and phone number/email address, and we will contact you.

Thank you for helping with this survey. Your input is critical to this. Results from this study will be available in early 2002. We hope to be presenting our findings at the Transportation Research Board Conference in Washington, D.C. in January 2002.

This survey was created with WebSurveyor.

APPENDIX B: INTERVIEW QUESTIONS – PROFESSIONALS

What do today's transportation planners need to know?
- Knowledge areas
- Skills

Have these changed in the decade since ISTEA? How?

What are the biggest strengths of the people who apply for planning positions at your agency/organization?

What are the biggest weaknesses?

Have these strengths and weaknesses changed in the decade since ISTEA? How?

How good a fit would you say there is between the needs of the job and the qualifications of the applicants?

What kinds of backgrounds do the people you hire for planning positions tend to have?
- planning degree?
- engineering degree?
- master's level?
- work experience?

What do you think the planning programs are doing right? What are they <u>not</u> doing right?

What do you think the transportation engineering programs are doing right? What are they <u>not</u> doing right?

How important is prior experience? What do they get out of it that they don't get from school?

If you could make one recommendation to transportation educators, what would it be?

APPENDIX C: INTERVIEW QUESTIONS – EDUCATORS

What is the goal of your transportation program in terms of the kind of knowledge and skills you impart to your students?

Has this changed in the last decade? How? Why?

How would you say your program compares to others in terms of goal, curriculum?

What is the biggest strength in transportation programs?

What is the biggest weakness in transportation programs?

How well prepared are your transportation planning students for professional transportation planning positions?

How could your program better prepare students for professional transportation planning positions?

What do you do to help your students bridge the divide between planning and engineering? Do you think it's enough? What else would you like to do?

What are other engineering programs doing to help students bridge this divide? More? Less? Can you give any interesting examples?

Do you think planning programs are doing enough from their end to help students bridge this divide? In what ways yes? In what ways no?

What is the most critical thing for transportation educators to do better?

APPENDIX D: DEGREE AND COURSE OFFERINGS BY PLANNING AND ENGINEERING PROGRAMS

TABLE D-1. Planning Programs: Degrees and Concentrations Offered

	School	Transportation Degrees / Concentrations Offered: bachelor	masters	ph.d.	total degrees	masters & phd	all three	concentration?	joint degree?
1	Alabama A&M University	1	1		2			1	
2	Arizona State University		1	1	2	1			
3	Ball State University	1	1		2				
4	Calif. Polytechnic State Univ.- San Luis Obispo	1	1		2				1
5	California State University - Pomona	1	1		2			1	
6	Clemson University		1		1				
7	Cleveland State University	1	1	1	**3**	1	1		
8	Columbia University	1	1	1	**3**	1	1		
9	Cornell University	1	1		2				
10	Eastern Michigan University	1	1		2				
11	Eastern Washington University	1	1		2			1	
12	Florida Atlantic University	1	1		2				
13	Florida State University		1	1	2	1		1	
14	Georgia Institute of Technology		1	1	2	1		1	1
15	Harvard University		1		1			1	
16	Hunter College, City University of New York	1	1		2			1	
17	Iowa State University	1	1		2				
18	Kansas State University		1		1				
19	Massachusetts Insitute of Technology	1	1	1	**3**	1	1		
20	Michigan State University	1	1		2				
21	Morgan State University		1		1			1	
22	New York University		1		1			1	
23	Ohio State University		1	1	2	1			
24	Portland State University		1		1			1	
25	Pratt Institute		1		1				
26	Rutgers		1	1	2	1		1	
27	San Jose State University		1		1			1	
28	State University of New York at Albany	1	1		2			1	
29	SUNY Buffalo		1		1				
30	Texas A&M University		1	1	2	1		1	
31	University of Arizona		1		1				
32	University of California at Irvine		1	1	2	1		1	
33	University of California at Berkeley		1	1	2	1		1	1
34	University of California, Los Angeles		1	1	2	1		1	
35	University of Cincinnati	1	1		2				
36	University of Colorado at Denver	1	1	1	**3**	1	1		
37	University of Florida		1	1	2	1		1	

TABLE D-1. Planning Programs: Degrees and Concentrations Offered

	School	Transportation Degrees / Concentrations Offered: bachelor	masters	ph.d.	total degrees	masters & phd	all three	concentration?	joint degree?
38	University of Hawaii at Manoa		1		1				
39	University of Illinois at Chicago		1	1	2	1		1	
40	University of Illinois at Urbana-Champaign	1	1	1	**3**	1	1		
41	University of Iowa		1		1			1	
42	University of Kansas		1		1			1	
43	University of Maryland at College Park		1		1				
44	University of Massachusetts at Amherst		1	1	2	1			
45	University of Memphis		1		1				
46	University of Michigan		1	1	2	1		1	
47	University of Minnesota		1		1			1	
48	University of Nebraska-Lincoln		1		1			1	1
49	University of New Mexico		1		1				
50	University of New Orleans		1		1				
51	University of North Carolina at Chapel Hill		1	1	2	1		1	
52	University of Oklahoma		1		1			1	
53	University of Oregon		1		1				
54	University of Pennsylvania		1	1	2	1		1	
55	University of Rhode Island		1		1				
56	University of Southern California	1	1	1	**3**	1	1	1	
57	University of Tennessee, Knoxville		1		1			1	
58	University of Texas at Arlington		1		1				1
59	University of Texas at Austin		1	1	2	1		1	
60	University of Virginia		1		1				
61	University of Washington	1	1	1	**3**	1	1		
62	University of Wisconsin-Madison		1		1				
63	University of Wisconsin-Milwaukee		1		1			1	1
64	Virginia Commonwealth University		1		1				
65	Virginia Polytechnic Inst. & State Univ.	1	1	1	**3**	1	1		
66	Wayne State University		1		1			1	
	Total	**21**	**66**	**24**	**111**	**24**	**8**	**32**	**6**
	Share	**0.02**	**0.02**	**0.02**		**0.02**	**0.02**	**0.00**	**0.00**
	Average				**1.68**				
	Standard Deviation				**0.68**				

TABLE D-2. Planning Programs: Courses Offered

School	Transportation Courses Offered																	
	general trans planning	urban trans planning	regional trans planning	geog of trans	trans mgmt	trans & envirmt	land use/ growth mgmt	public transp/ transit	seminar/ special topic	trans system design	trans & econ devel.	trans safety	intro/ traffic eng.	studio/ practicum	facility design	ITS	demand analysis	finance/ econ.
1																		
2	1																	
3		1																
4																		
5																		
6																		
7																		
8																		
9	1	1								1			1					
10																		
11	1							1	1									
12	1	1															1	
13	1					1	1		1								1	
14	1	1	1				1				1							1
15																		
16	2																	
17	1																	
18																		
19		2			1	1		2										
20		1		1														
21																		
22		1																
23		1							1									
24		3	1				1											1
25																		
26	1	2					1	2					2		1	1		2
27		1							1				1					
28	1						1		2					1				
29	1																	
30	1	1					1											
31	1	1																
32	1					1	1										1	1
33		1	1				1	1				1		1		1		1
34	1					1	1										1	1
35																		
36																		
37																		

TABLE D-2. Planning Programs: Courses Offered - Continued

School	Transportation Courses Offered																	
	general trans planning	urban trans planning	regional trans planning	geog of trans	trans mgmt	trans & envirmt	land use/ growth mgmt	public transp/ transit	seminar/ special topic	trans system design	trans & econ devel.	trans safety	intro/ traffic eng.	studio/ practicum	facility design	ITS	demand analysis	finance/ econ.
38																		
39	2	3			1				2							1		
40		1																
41	1	1					1		1								1	1
42	1	1						1	1									
43																		
44									1									
45	1																	
46							1		2									
47		2				1	3			1				1				1
48																		
49									1									
50																		
51		1						1										
52		1	1				1	1										
53																		
54							2		1								1	
55																		
56		1			1													
57	1																	
58																1		
59	1	2						1	2									
60							1											
61							1											
62																		
63																		
64																		
65			1															
66																		
Tot	**23**	**31**	**5**	**1**	**3**	**5**	**19**	**10**	**17**	**2**	**1**	**1**	**4**	**3**	**1**	**4**	**6**	**9**
Shr	**0.13**	**0.18**	**0.03**	**0.01**	**0.02**	**0.03**	**0.11**	**0.06**	**0.10**	**0.01**	**0.01**	**0.01**	**0.02**	**0.02**	**0.01**	**0.02**	**0.03**	**0.05**
Avg																		
SD																		

TABLE D-2. Planning Programs: Courses Offered - Continued

School	Transportation Courses Offered									Program Offering Courses		
	modeling	bike/ ped	highway	system plg/ analysis	transp theory	trans design	trans policy planning	adjustment*	total courses	offered in planning	offered in engineering	offered by other dept.
1									0	0	0	0
2									1	1	0	0
3									1	0	0	1
4				2	1	1			4	0	4	0
5									0	0	0	0
6									0	0	0	0
7									0	0	0	0
8									0	0	0	0
9	1							-1	4	0	3	1
10									0	0	0	0
11									3	3	0	0
12							1	-1	3	0	0	3
13		1	1	1			1	-1	8	6	2	0
14		1						-1	6	0	0	6
15							1		1	0	0	1
16									2	2	0	0
17									1	1	0	0
18									0	0	0	0
19				1			1	-1	7	0	0	7
20									2	1	0	1
21									0	0	0	0
22									1	1	0	0
23									2	2	0	0
24							1	-2	5	5	0	0
25									0	0	0	0
26	1						2	-2	13	4	8	1
27									3	2	1	0
28		1							6	6	0	0
29									1	1	0	0
30				2				-1	4	4	0	0
31									2	2	0	0
32		1		1					7	4	3	0
33				1			1	-1	9	4	5	0
34									5	5	0	0
35									0	0	0	0
36									0	0	0	0
37		1					1		2	2	0	0

TABLE D-2. Planning Programs: Courses Offered - Continued

School	Transportation Courses Offered									Program Offering Courses		
	modeling	bike/ ped	highway	system plg/ analysis	transp theory	trans design	trans policy planning	adjustment*	total courses	offered in planning	offered in engineering	offered by other dept.
38									0	0	0	0
39							1	-1	9	9	0	0
40									1	0	0	1
41							2		8	7	1	0
42							1	-1	4	4	0	0
43									0	0	0	0
44									1	1	0	0
45									1	1	0	0
46							1		4	4	0	0
47							1	-2	8	4	3	1
48									0	0	0	0
49									1	1	0	0
50									0	0	0	0
51	1						1		4	4	0	0
52				2				-1	5	5	0	0
53									0	0	0	0
54	2			1				-2	5	4	1	0
55									0	0	0	0
56							2	-2	2	2	0	0
57									1	0	1	0
58	1						1		3	3	0	0
59									6	3	3	0
60									1	1	0	0
61	1							-1	1	1	0	0
62									0	0	0	0
63							1		1	1	0	0
64									0	0	0	0
65				1					2	2	0	0
66							1		1	1	0	0
Tot	**7**	**5**	**1**	**12**	**1**	**1**	**21**		**172**	**114**	**35**	**23**
Shr	**0.04**	**0.03**	**0.01**	**0.07**	**0.01**	**0.01**	**0.12**			**0.66**	**0.20**	**0.13**
Avg									**2.61**	**1.73**	**0.53**	**0.35**
SD									**2.92**	**2.12**	**1.42**	**1.20**

* To account for courses listed under multiple topics.

TABLE D-3. Non-Planning Programs: Transportation Degrees and Departments Offering Coursework

School	Transportation Degrees/Concentrations Offered Within Department							Departments Offering Transportation Planning Coursework				
	bachelors	masters	phd	addl masters or phd degrees	total degrees	masters and phd	joint degree	civil, envtl or matl/constr eng	transp science or studies	public policy/ admin/ affairs	economics	other
1 California State Univ. at Long Beach		1			1					1		
2 California State Univ. at Long Beach	1	1			2			1				
3 Cornell University	1	1	1		3	1		1				
4 George Mason University		1			1					1		
5 Georgia Institute of Technology	1	1	1		3	1		1				
6 Georgia State University	1	2		1	3					1		
7 Iowa State University	1	1	1		3	1		1				
8 Kansas State University	1	1	1		3	1		1				
9 Massachusetts Inst. of Technology		1	1		2	1			1			
10 Morgan State University		1			1				1			
11 New Jersey Institutue of Technology		1	1		2	1		1				
12 N. Carolina Ag. & Tech. State Univ.	1				1						1	
13 North Carolina State University	1	1	1		3	1		1				
14 North Dakota State University	1	1	1		3	1		1				
15 Northwestern University		1			1					1		
16 Northwestern University	1	1	1		3	1		1				
17 Oregon State University	1	1	1		3	1		1				
18 Pennsylvania State University	1	1	1		3	1		1				
19 Polytechnic University	1	1	1	1	4	1		1				
20 Purdue University	1	1	1		3	1		1				
21 Rensselaer Polytechnic Institute	1	1	1	2	5	1		1				
22 San Jose State University		1			1							1
23 South Carolina State University					0				1			
24 Tennessee Technological University	1	1			2			1				
25 Texas A&M University	1	1	1	1	4	1		1				
26 The City College Of New York	1	1	1	1	4	1		1				
27 University of Alabama	1	1	1		3	1		1				
28 University of Alabama at Birmingham	1	1			2			1				
29 University of Alabama in Huntsville	1	1	1		3	1		1				
30 University of Arkansas			1		1	1				1		
31 University of Arkansas		1			1							1
32 University of Arkansas	1	1	1	2	5	1		1				
33 University of California, Berkeley	1	1	1	2	5	1	1	1				

TABLE D-3. Non-Planning Programs: Transportation Degrees and Depts Offering Coursework: cont'd

School	Transportation Degrees/Concentrations Offered Within Department							Departments Offering Transportation Planning Coursework				
	bachelors	masters	phd	addl masters or phd degrees	total degrees	masters and phd	joint degree	civil, envtl or matl/constr eng	transp science or studies	public policy/ admin/ affairs	economics	other
34 University of California, Davis		1	1		2	1			1			
35 University of California, Irvine		1	1		2	1			1			
36 University of California, Irvine			1		1						1	
37 University of California, Irvine	1	1	1		3	1		1				
38 University of Florida	1	1	1		3	1		1				
39 University of Idaho	1	1			2			1				
40 University of Illinois at Chicago	1	1	1		3	1		1				
41 University of Kentucky		1	1	1	2	1		1				
42 University of Massachusetts	1	1	1		3	1		1				
43 University of Memphis	1	1	1		3	1		1				
44 University of Minnesota		1	1	1	2	1		1				
45 University of Minnesota					0				1			
46 University of Missouri, Columbia	1	1	1		3	1		1				
47 University of Missouri, Rolla	1	1			2			1				
48 University of Nebraska, Lincoln		1	1		2	1		1				
49 University of Nevada, Las Vegas		1	1		2	1		1				
50 University of Rhode Island	1	1	1		3	1		1				
51 University of South Florida		1			1					1		
52 University of South Florida		1			1						1	
53 University of South Florida	1	1		1	2			1				
54 University of Southern California	1	1	1		3	1		1				
55 University of Tennessee	1	1	1		3	1		1				
56 University of Texas at Austin	1	1	1		3	1	1	1				
57 University of Virginia	1	1	1		3	1		1				
58 Utah State University	1	1	1	1	4	1		1				
59 Vanderbilt University	1	1	1		3	1		1				
60 VA Polytechnic Inst. & State Univ.	1	1	1	1	4	1		1				
61 Wayne State University	1	1	1		3	1		1				
62 West Virginia University	1	1	1		3	1		1				
Total	**42**	**58**	**44**	**15**	**155**	**43**	**2**	**45**	**6**	**6**	**3**	**2**
Share	0.68	0.94	0.71	0.24		0.69	0.03	0.73	0.10	0.10	0.05	0.03
Average					**2.50**							
Standard Deviation					**1.13**							

APPENDIX D-4. Non-Planning Programs: Transportation Courses Offered

School	Transportation Planning Courses Offered																
	general trans planning	urban trans planning	regional trans planning	geog of trans	trans mgmt	system evaluation	trans & envirmt	trans law	land use/ growth mgmt	public transp/ transit	seminar/ special topic	trans system design	GIS	studio/ practicum	facility design	ITS	demand analysis/ forecasting
1		1			2												
2	1																
3		1									3						
4		1		1							4			1			
5		1					1		1				1				1
6		1			2				1								
7	1				1						1						
8	1	1															
9		1			1		1			1							2
10		2				1				1	4						
11		1								1	2						1
12								1									
13		1								1							
14	1		1		1												
15																	
16					1												2
17										1				1			
18	1																
19		1			1					1	1					1	1
20	1									1							
21										1					1		
22					2												
23																	
24	1																
25		3			1						1						
26	1	2				1	1			2							1
27	1																
28	1	1															
29		1															
30																	
31	1																
32	1								1	1							
33	3	1			1				1	1							

APPENDIX D-4. Non-Planning Programs: Transportation Courses Offered: cont'd

School	Transportation Planning Courses Offered																
	general trans planning	urban trans planning	regional trans planning	geog of trans	trans mgmt	system evaluation	trans & envirmt	trans law	land use/ growth mgmt	public transp/ transit	seminar/ special topic	trans system design	GIS	studio/ practicum	facility design	ITS	demand analysis/ forecasting
34							1			1							1
35									1								
36		1															
37	2	1								1							2
38		1															
39	1									1							
40		1	1	1													
41		1															
42	1									1		1		1		1	
43		1				1				1							
44		1															
45									2	1							
46	1																
47																	
48		1								1							1
49	1									1							1
50		1															
51																	
52																	
53	1								1	1							
54	1																
55	1	1								1							
56	1	2			1							1				1	1
57	1						1		1	1						1	
58		1	1							1							1
59	1	1					1			1							
60	1		1						1	1							
61		1															
62		1								1							
Totl	**28**	**36**	**4**	**2**	**14**	**3**	**6**	**1**	**10**	**27**	**16**	**2**	**1**	**3**	**1**	**4**	**15**
Shr	0.13	0.17	0.02	0.01	0.07	0.01	0.03	0.00	0.05	0.13	0.08	0.01	0.00	0.01	0.00	0.02	0.07
Avg																	
SD																	

APPENDIX D-4. Non-Planning Programs: Transportation Courses Offered - Cont'd

School	Transportation Plg Courses Offered							Depts Offering Courses					
	finance/ econ.	modeling	data collection	system planning/ analysis	trans policy planning	adjustment*	Total courses	offered by civil	offered by planning	offered by policy/ admin	offered by geography	offered by economics	offered by other
1					4	-3	4	0	0	0	4	0	0
2							0	1	0	0	0	0	0
3		1				-1	4	4	0	0	0	0	0
4	1				1		9	0	0	4	1		4
5			1	1	1		8	8	0	0	0	0	0
6					1	-2	3	0	0	3	0	0	0
7						-1	1	2	0	0	0	0	0
8							1	1	0	0	0	1	0
9	1	1		1	2	-4	7	5	0	2	0	0	0
10						-1	7	0	0	0	0	0	7
11	2	1					8	8	0	0	0	0	0
12					1		2	0	0	0	0	0	2
13					1		3	3	0	0	0	0	0
14							2	3	0	0	0	0	0
15	3				1		4	0	0	4	0	0	0
16	1			2	1	-2	5	4	0	0	0	1	0
17				1			3	3	0	0	0	0	0
18	1						1	2	0	0	0	0	0
19	1			1	1		9	9	0	0	0	0	0
20				2			3	4	0	0	0	0	0
21	1			1			4	4	0	0	0	0	0
22	1		1	1	1		6	0	0	0	0	0	6
23							0	0	0	0	0	0	0
24							0	1	0	0	0	0	0
25				1		-1	5	5	0	0	0	0	0
26	2			1	1	-2	9	10	0	0	0	0	0
27							0	1	0	0	0	0	0
28						-1	0	1	0	0	0	0	0
29							1	1	0	0	0	0	0
30							0	0	0	0	0	0	0
31							0	0	0	1	0	0	0
32							2	3	0	0	0	0	0
33	2		1				7	10	0	0	0	0	0

APPENDIX D-4. Non-Planning Programs: Transportation Courses Offered - Cont'd

School	Transportation Plg Courses Offered							Depts Offering Courses					
	finance/ econ.	modeling	data collection	system planning/ analysis	trans policy planning	adjustment*	Total courses	offered by civil	offered by planning	offered by policy/ admin	offered by geography	offered by economics	offered by other
34	1		1	1	1	-1	6	4	0	0	0	0	2
35					1	-1	1	0	0	0	0	0	1
36	2	1			1	-1	4	0	0	0	0	4	0
37	2	3	2	1	1	-4	9	7	0	0	0	0	4
38				1			2	2	0	0	0	0	0
39							1	2	0	0	0	0	0
40		1				-2	2	1	0	0	1	0	0
41							1	1	0	0	0	0	0
42	1			2	1	-1	7	8	0	0	0	0	0
43							3	3	0	0	0	0	0
44	1			1			3	3	0	0	0	0	0
45							3	0	0	3	0	0	0
46		1				-1	0	1	0	0	0	0	0
47							0	0	0	0	0	0	0
48	1						4	4	0	0	0	0	0
49							2	3	0	0	0	0	0
50							1	1	0	0	0	0	0
51							0	0	0	0	0	0	0
52							0	0	0	0	0	0	0
53	1	2				-1	4	5	0	0	0	0	0
54				1			1	2	0	0	0	0	0
55				2			4	5	0	0	0	0	0
56	1	1	1	2		-1	10	9	2	0	0	0	0
57	1			3		-2	6	7	0	0	0	0	0
58	1					-1	4	4	0	0	0	0	0
59							3	4	0	0	0	0	0
60				1			4	5	0	0	0	0	0
61	1						2	2	0	0	0	0	0
62				1			3	3	0	0	0	0	0
Totl	**29**	**12**	**7**	**28**	**21**		**208**	**179**	**2**	**17**	**6**	**6**	**26**
Shr	0.14	0.06	0.03	0.13	0.10			**0.86**	**0.01**	**0.08**	**0.03**	**0.03**	**0.13**
Avg							**3.35**	**2.89**	**0.03**	**0.27**	**0.10**	**0.10**	**0.42**
SD							**2.82**	**2.85**	**0.25**	**0.91**	**0.53**	**0.54**	**1.37**

* To account for courses listed under multiple topics.

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